January, 1956

Vol. 45
No. 1

Industrial Arts and Vocational Education

Season's Greetings

The Shop Teachers' Professional Magazine

Breaking through the Resistant Crust

Photo courtesy Monsanto Chemical Company

In the man's hands is the equivalent in Krilium of pile of compost between man and boy. Krilium is not subject to bacterial attack, lasts much longer.

Clayey soil packs hard, resists tillage, kills seedlings and keeps life-giving water and air from penetrating the surface. The Monsanto Chemical Company has developed a chemical which causes resistant clay to "open" up and become fertile and tractable. This "Krilium" may be one answer to the world's demand for more productive land.

In some men you sense a resistance that is like nothing in the world so much as hard-packed, barren and unproductive earth. With some men, perhaps it is too late. But with boys in their early teens, habits have not hardened and every educator owes it to the boy, to himself, and to society to apply some aerating and softening influence so that the native fertility and productivity in every boy can break through.

Surely educational theory agrees the lad's interest must be pulled beyond himself so that the back and forth traffic set up can increasingly get through. Certainly educators agree enthusiasm must be focused on something bigger, better and beyond the lad's own petty ego. Certainly in mechanical drafting there is golden opportunity not only in a new class, a new subject, but in the fact the boy is linking brain and hands in a task that is the first step on a road that can lead to the self-transcending goals of engineering, scientific and other creative contribution . . . with good to the world, with honor, prestige and appreciation to the giver.

What better can anybody ask? And why run the risk of contradicting all the influences brought here to bear, by permitting indifference in the selection of the drafting tools with which the boy will work? Certainly the concept of the value to boy and environment alike is worth far more than the petty economy to be gained by cheap and worthless tools.

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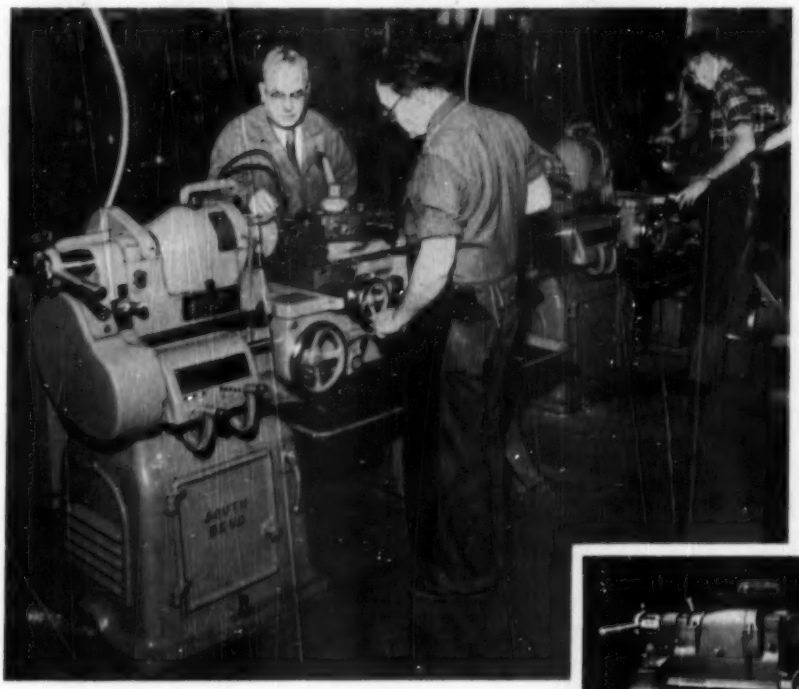


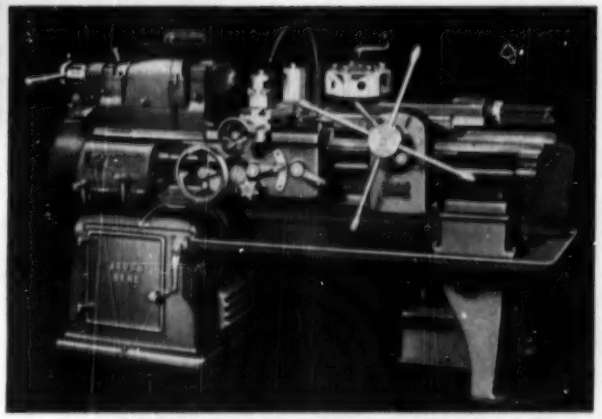
South Bend 2-H Turret Lathes, Williamsport Technical Institute, Williamsport, Pa.

IT'S SOUTH BEND FOR PRACTICAL TURRET LATHE TRAINING

Turret lathe operation is an essential part of any well-rounded machine shop course. With South Bend Turret Lathes you can give it economically, thoroughly and with maximum utilization of equipment. They are widely used in industry and have a reputation for exacting work. You can use them with the assurance that your students are receiving practical training.

South Bend Precision Turret Lathes offer many advantages. Among them are: ease of operation—almost fool-proof design—a wider range of power turning, facing, thread cutting and turret feeds, and inexpensive tooling. Also—and this is important—they are easily and quickly converted to engine lathes. Compound rest cross slides and regular tailstocks are available to replace the double tool cross slides and the ram turrets. This permits dual usage as either turret lathes or engine lathes if desired.

South Bend Turret Lathes are made in three sizes, 2-H, 13″ and 10″. Send for free catalog giving complete information on turret lathes and other machine tools, turret attachments, accessories and teaching helps.

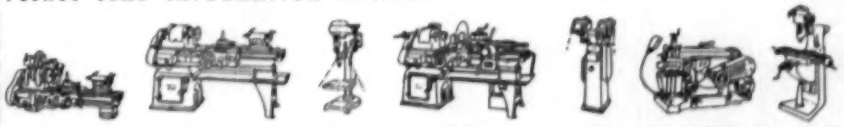


South Bend 2-H Turret Lathe as shown, less electrical and coolant equipment, and collet attachment, f.o.b. factory— **$3350**

Project: TAP WRENCH

The turret lathes shown above were tooled to produce stems and nuts for "T" handle tap wrenches. This wrench is one of the 34 projects fully detailed in the new South Bend Machine Shop Projects book. A sample copy of this 104 page $2 book and a copy of the new revised edition of How to Run a Lathe (total value $2.50) will be sent postpaid to shop instructors for only $1.00.

PLEASE SEND INFORMATION CHECKED:



☐ 9″ and 10″ BENCH LATHES ☐ 10″ to 16-34″ FLOOR LATHES ☐ DRILL PRESSES ☐ ½″ & 1″ Collet TURRET LATHES ☐ TOOL GRINDERS ☐ 7″ BENCH SHAPERS ☐ MILLING MACHINES

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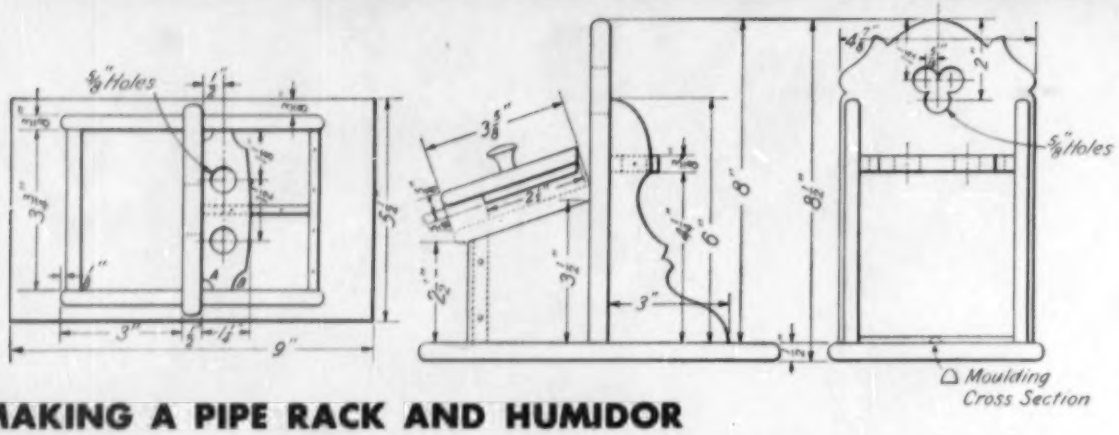

MAKING A PIPE RACK AND HUMIDOR

Nicholson is happy to present this exercise in precise woodworking and finishing to the school-shop student. These designs are optional. The student is encouraged to modify them and create his own.

Material: Base—1 pc. 9" x 5 1/2" x 1/2"; upright—1 pc. 8" x 4 7/8" x 1/2"; humidor sides—2 pcs. 3 1/2" x 3" x 3/8"; front—1 pc. 3 3/4" x 2 3/4" x 3/8"; cover—1 pc. 4 3/4" x 3 5/8" x 3/8"; inside cover—1 pc. 3 1/2" x 2 1/2" x 5/16"; rack sides—2 pcs. 6" x 2" x 3/8"; holder—1 pc. 3 3/4" x 1 1/4" x 3/8"; molding—1 pc. 3 3/4" x 5/16" x 1/4" and 1 pc. 2 3/4" x 5/16" x 1/4". **Hardware:** 6 1" #15 escutcheon pins, 4 3/4" #18 escutcheon pins, 1 1/2" #16 brads, 1 small brass knob or drawer pull.

Tools: Plane, try square, marking gage, knife, rule, backsaw and bench hook, coping saw, bradawl, hammer, nail set, #10 auger bit, bit brace, Nicholson file brush and the following Nicholson files: 10" Half Round Second Cut, 10" Mill Bastard and 10" Round Second Cut.

SCHEDULE OF OPERATIONS

Square all rough stock to finished dimensions as listed under Material. **BASE: 1.** Lay out 4 round edges. Finger gage 1/8" line on all edges and surfaces. **2.** With flat side of Nicholson 10" Half Round file held at 45° angle, make 1/8" chamfer on all edges. **3.** Remove chamfer corners on all edges, using long diagonal strokes. **4.** Finish with 10" Mill Bastard, following same contour on ends as on sides.

Note: To give fine, smooth finish of which they are capable, Nicholson files should be brushed frequently.

UPRIGHT: 1. After laying out and tracing pattern on stock, cut out with coping saw. Shape wood to exact pattern with 10" Half Round Second Cut files. **2.** Give rounded effect with same file by stroking from surface over end. **3.** Lay out inverted clover leaf design. Measure down 1 1/2" on center line and locate points 5/16" on either side. Locate third point 2" from top on center line. Bore three holes with #10 bit. **4.** Finish insides and round edges of holes with 10" Round Second Cut file. **5.** Round straight edges of upright with 10" Mill Bastard and 10" Half Round Second Cut files.

RACK SIDES: 1. Lay out pattern and trace on squared stock. Cut out with coping saw and use same procedure as on top design of upright piece. **2.** Cut 3 3/4" piece of molding to fit between sides, even with end. **3.** Cut 2 3/4" piece to fit along longitudinal center line.

HOLDER: 1. Finger gage line 1/2" from back edge and locate centers 1 1/8" from each end. Hold stock flat in vise and bore 2 vertical holes with #10 bit. (Wood will crack if not held tightly.) **2.** Lay out pattern for front edge and trace. File long curve with 10" Half Round Second Cut. 10" Round Second Cut file should be used to give 1/2" radius at "B". **3.** File curve "A" enough to let 2 pipe cleaners slide in easily.

HUMIDOR: Sides. Make round, flat edge on front of each piece and finish with 10" Half Round Second Cut file. **Front.** Place in position and mark angle of slant with sharp pencil. Plane to this line. **Cover.** Plane edge "C" at angle to fit snugly against upright. Lay out and complete round edges as in base piece, but on only 3 sides. **Inside cover** should be planed to same "C" angle.

ASSEMBLY: Make holes with bradawl for all brads and escutcheon pins to avoid cracking wood. **1.** Locate transverse center line of base. Nail upright in position with 3 1 1/2" #16 brads spaced equidistant. Set brads with nail set. **2.** Place sides and end of humidor in position. Locate 2 equally-spaced bradawl holes on each side for 1" #15 brass escutcheon pins. **3.** Nail humidor to base and upright with #16 brads. **4.** For side pieces of pipe holder, drive 2 brads from bottom of base on each side on 9/16" line. Allow to protrude 1/8". Press into position and finish nailing. Another brad through upright 3 3/4" from bottom adds strength. **5.** Fasten 2 3/4" molding along longitudinal center line, and 3 3/4" piece at right angles between uprights, using 2 3/4" #18 brass escutcheon pins spaced equidistant on each piece. **6.** Fasten holder to side pieces with bradawl and 1 #15 brass escutcheon pin on side.

FINISH: 1. Sand to remove all lines and blemishes. Apply maple or pine stain and wipe dry. Apply 2 coats of lacquer sealer and smooth with #0000 steel wool. Apply coat of clear lacquer and allow to dry. Apply wax and polish to high lustre. **2.** Locate center of humidor top and screw brass knob into position. **3.** Make cardboard lining for humidor. Cover cardboard with heavy aluminum foil, allowing enough to overlap and seal edges, and slide into position. **4.** Cover inside of cover with foil and brad into position.

* * *

The Nicholson 10" Round and Half Round Second Cut files and the Nicholson 10" Mill Bastard file (left to right) are recommended for this project. They and hundreds of other Nicholson and Black Diamond files and rasps are readily available through industrial suppliers and hardware stores.

FREE REPRINTS OF THIS PAGE

for school-shop use will be sent to school heads or instructors on request. Please ask for "How-To-Project No. 14," stating minimum number of copies required.

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JANUARY
1956

VOL. 45 NO. 1

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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This Month's Cover

The cover picture on this issue of the magazine depicts several students in the furniture-making department at South High School, Worcester, Mass.

Shown are, from left, Daniel Casey, Robert Cobb, Paul Yatsonski, and Thomas Phelan. The table illustrated was built by Robert Cobb, and the footstool by Paul Yatsonski and Thomas Phelan.

The photograph was made by Tad Arnold, student, and submitted by Ralph C. Mayo, instructor, South High School.

★ ★ ★ ★

JOIN THE MARCH OF DIMES

January 3 to 31

★ ★ ★ ★

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Association News

INDUSTRIAL ARTS CONFERENCE

On Thursday, November 10, 1955, the Industrial Arts Conference of the Mississippi Valley opened its annual meeting at 9:30 a.m., with an attendance of about sixty. This group of earnest teacher educators have been meeting for a two-and-one-half-day meeting for 42 years.

Verne C. Fryklund, who is the general chairman of the group, opened the morning session, and then turned the meeting over to Ralph Whalin, who, assisted by Walter Klehm, and Ray Stombaugh, proposed the topic, "Subject Matter Areas Essential in the Preparation of Industrial Arts Teachers."

The first speaker, Walter Klehm, discussed the technical area, which includes the shopwork, drawing, and laboratory work. He stated that the analysis method is still applicable in selecting the tools, processes, and subject matter of the course. He cautioned against making industrial arts a book course and urged teacher educators to give their students much manipulative experience so that when they become teachers they will be able to prepare their future industrial-arts students, vocational students, and the do-it-yourself enthusiasts in the use of tools and materials.

Ralph Whalin discussed the professional preparation of industrial-arts teachers. He chose for his sources from which areas of preparation may be derived: (*a*) opinions of specialists, (*b*) teachers, (*c*) state certification requirements, and (*d*) professional literature.

From these sources he derived the following information. Education and psychology are accorded 22 semester hours on an average. At least two courses of psychology are usually required, as is also at least one course in education. The speaker stated that the semester hours devoted to professional industrial-arts courses is so great that the students do not receive enough technical training for their future work. However, the mistake should not be made to give these future teachers little or no formal professional industrial-arts work.

Ray H. Stombaugh discussed general education and related areas of preparation, and the problems it brings up in the preparation of industrial-arts teachers. He offered the following proposed general education program: English, 6 hours including 3 hours of literature; speech, 3 hours; social science, 12 hours; physical science, 3 hours; biological science, 3 hours; geography, 3 hours; art, 2 hours; music, 2 hours; general psychology, 3 hours; recreation and hygiene, 7 hours; electives in general education, 8 hours.

Besides the 55 semester hours of work just mentioned, students unable to demonstrate competency at a predetermined level, in any of the following 3 areas, are offered 3 hours of mathematics, English, and social science.

The afternoon session was devoted to a discussion of recent important research bearing on industrial education. The general chairman of this program was E. E. Ericson.

The first speaker, Robert Kinker, Bloomington, Ind., referred to several analyses of junior high school students, apprentice enrollments in Wisconsin Schools of Vocational and Adult Education, men admitted at a teacher education institution and similar studies on the comprehensive general shop and other industrial-arts offerings.

H. H. London, Columbia, Mo., presented a bulletin of the University of Missouri on the factors relating to the choice of industrial education teaching as a career, and the retention of these teachers in the profession.

William J. Micheels presented several research studies made at various teacher education colleges; also a study showing the educational viewpoints of members of the industrial-arts conference and of graduate students at three colleges and universities which showed that members of the Industrial Arts Conference are not significantly different from industrial education graduate students in the emphasis or degree of extremeness of their educational viewpoints.

The Friday morning session discussed "Crucial Areas in Which Research Is Needed."

L. A. Praaken was the general chairman. The first speaker was J. A. Fuzak. He stated that our research is sporadic and unrelated, and that it is not of the type that can be applied on the classroom level. He also said most of the studies treated about superficial studies.

John Jarvis, the next speaker, stated that if our research is to have any value both subject and questions must be chosen at random, as must also the teachers who are to make the studies, and the students who are to be surveyed and studied.

John C. Wenrich spoke on techniques which might be useful in identifying crucial areas

(Continued on page 8A)

SHELDON Precision LATHES
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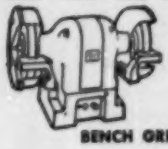
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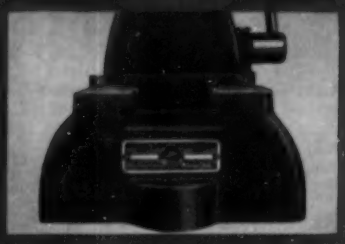
FINEST STAND AND LATHE EVER

Here for the first time is a lathe stand that gives you *all* the safety, rigidity and convenience features you want and need in your school shop. For safety, headstock pedestal completely encloses motor and belts — has door with full-length piano hinge for access to drive — and there's a cast cover plate that encloses rear of lathe headstock! Ends are 3/16" steel plate, and top and shelf in motor compartment are 1¼" thick wood, for the rigidity essential to accurate lathe work. Open shelf is recessed for convenient storage of tools, accessories. And the stand comes assembled, ready for use.

The Atlas-CLAUSING 12" lathe has significant new features too: the bed is *heavier* for more accurate work, ways are *ground* for easier positioning of tool support base and tailstock. Has sealed-for-life ball bearings, lever-controlled bed locks, 60-hole indexing mechanism. Write for complete details about this great new machine and stand.

SAFETY·

Here are stands that set new standards for stability, convenience, and safety . . . that offer you, *for the first time*, the safety of completely enclosed pulleys and belts . . . the rigidity of 3/16" steel plate . . . and the stability of pyramid design. These new stands provide a rugged foundation for accurate work and they are a boon to school shops where safety is of vital importance.



Base is static heavier, has ground ways.

One movement of lever loosens tool support for instant positioning, or anchors it to bed. Tailstock has identical lock.

Headstock spindle is turned from a solid bar of tough, fine-grained steel, accurately ground. Sealed-for-life ball bearings take all radial and thrust loads, and are preloaded at factory to eliminate spindle play. Top is hinged to make belt changing easy. Rear is covered for safety.

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A heavy-duty, precision machine, engineered to plane to better finish and accuracy . . . with MAXIMUM SAFETY! 42" tables. 32" x 4½" safety fence. Tables ground flat to within .005" overall! Many other exclusive features. New stand, with 3/16" thick steel plate end sections, has pyramid design for maximum stability. Motor is enclosed in base, and belts and pulleys are protected by belt guard furnished. Has built-in dust chute, and opening for flush-type switch. Top and shelf are 1¼" thick gumwood. Completely assembled, ready for use. Feet are drilled for floor bolting. 13" x 25" x 26" high.

Ball-Bearing Belt and Disc Sander

Finishes work of practically any form, shape or size . . . flat surfaces, curves, angles, double angles, edges, irregular shapes . . . in metals and plastics as well as wood. A rugged, husky sander — perfect for school shops. New heavy-duty, pyramid design stand comes completely assembled, ready for use. Motor and belt are enclosed in base. End sections are 3/16" thick steel plate for rigid machine support. Built-in dust chute, and opening for flush-type switch. Top and shelf are 1¼" thick gumwood. Top and steel motor base are drilled for easy installation, as are feet for floor bolting. 13" x 25" x 26" high.

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ASSOCIATION NEWS

(Continued from page 4A)

of research. He called attention to the week-long conference called in June, 1955, by the U. S. Office of Education where a random list of 75 problems was developed out of which a priority list of 15 research problems was then selected.

He also reported that the results of a questionnaire by members suggest an interest and concern in relation to (1) industrial-arts objectives with which might be associated problems under *outcomes;* (2) contents and method; (3) evaluation.

The Friday afternoon session was presided over by DeWitt Hunt. The subject discussed was "Public Relations for Industrial Arts."

E. W. Tischendorf defined public relations as an interchange of information and ideas between an institution or organization and its publics, and for our field the techniques are: good teaching, co-operation with teachers and administrators of below college level, and departmental esprit de corps.

G. H. Silvius and H. E. Franklin spoke in the same strain.

The chairman of the Saturday morning session was P. S. Waldeck. The subject for discussion was: "Should Supervision on the State Level Be Combined with Supervision of T. & I. Education."

E. M. Claude, P. M. Waldeck, and Otho L. Barnett assisted in developing the subject.

At the business meeting it was reported that 47 regular members, and 25 visitors had attended the 1955 conference.

Two candidates — Earl Blanton, North Texas State College, Denton, Tex.; and R. John Coltharp, Memphis State College, Memphis, Tenn.; were admitted to membership.

The next meeting will be held at the La-Salle Hotel, Chicago, Ill., on November 8, 9, and 10, 1956.

FOUR-STATE CONFERENCE, PITTSBURG, KANSAS

On October 21–22, the 1955 Four-State Conference was held at the Kansas State Teachers College, Pittsburg. There were between 500 and 550 shop instructors and officials in attendance from the states of Arkansas, Missouri, Oklahoma, Kansas, and adjoining states.

Cecil Stanley, director of Vocational Education for Nebraska, and president of the American Vocational Association, addressed the opening general session on Friday afternoon, October 21. His subject was "The Forward Look in Education." He developed a number of factors involved in the *forward look*, after briefly discussing the activities and outlook of the AVA for the coming year.

The Friday evening general session was addressed by Dr. Chris Groneman of Texas A. and M. College. Speaking on "Challenges in Industrial Education," he clarified and discussed four significant challenges confronting the profession. The concluding general session on Saturday afternoon was a question-discussion round-up led by Dr. H. H. London of the University of Missouri, in which wide audience participation developed around a number of stimulating problems and questions. The Ship's Program followed this session and concluded the conference.

In the sectional meetings, which were well attended, a number of demonstrations, panels, round tables, and reports were given; and, on the whole, the discussions which followed were lively. Likewise, the commercial exhibits attracted considerable interest.

The 1956 conference has been scheduled for Friday and Saturday, October 26–27, and will be held in Pittsburg at the Kansas State Teachers College. — *J. V. Melton.*

WISCONSIN INDUSTRIAL ARTS CONVENTION

The Wisconsin Industrial Arts Association held its annual meeting at Milwaukee, Wis., on Thursday, November 3, 1955.

Fred S. Darling, Beloit, presided. John Jarvis, Stout State College, Menomonie, Wis., spoke on "Industrial Arts and Industrial Arts Methods."

He quoted an essay-type questionnaire that had been submitted to 166 graduates in a town of 15,000, and which was answered by 146. Out of this number of respondents only two said they would take industrial arts if they had it to do over again. He emphasized that teachers should set up higher standards and be more strict in having them enforced. He urged teachers to teach proper operations. For instance, knurling should not be done if grooving will do the job better.

He quoted Herbert W. Yankee's article, "Let's Make Drafting Realistic," which appeared on page 154 of the May, 1955, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

In a similar way other courses could be made realistic and effective.

Leo Ebben reported on a state secretaries' meeting which he attended at the American Industrial Arts Association convention at Atlantic City, and Roy Radtke, vice-president of the American Industrial Arts Association, reported on the arrangements that are being made in Milwaukee for the next AIAA convention.

He urged teacher education colleges, local schools, and teacher craftsmen to send in projects for an exhibit to be held at that

(Continued on page 16A)

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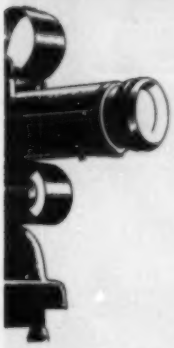

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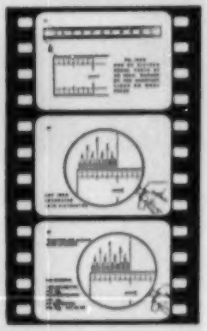

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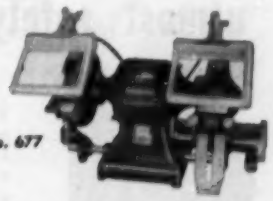

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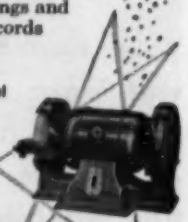

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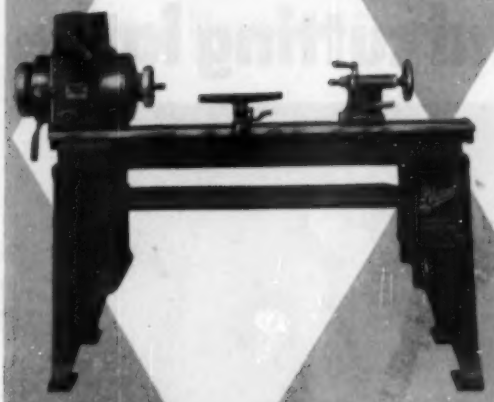

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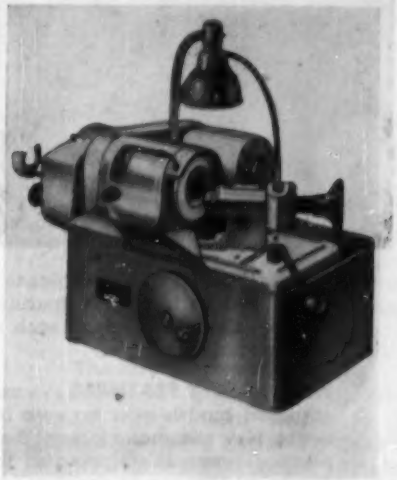

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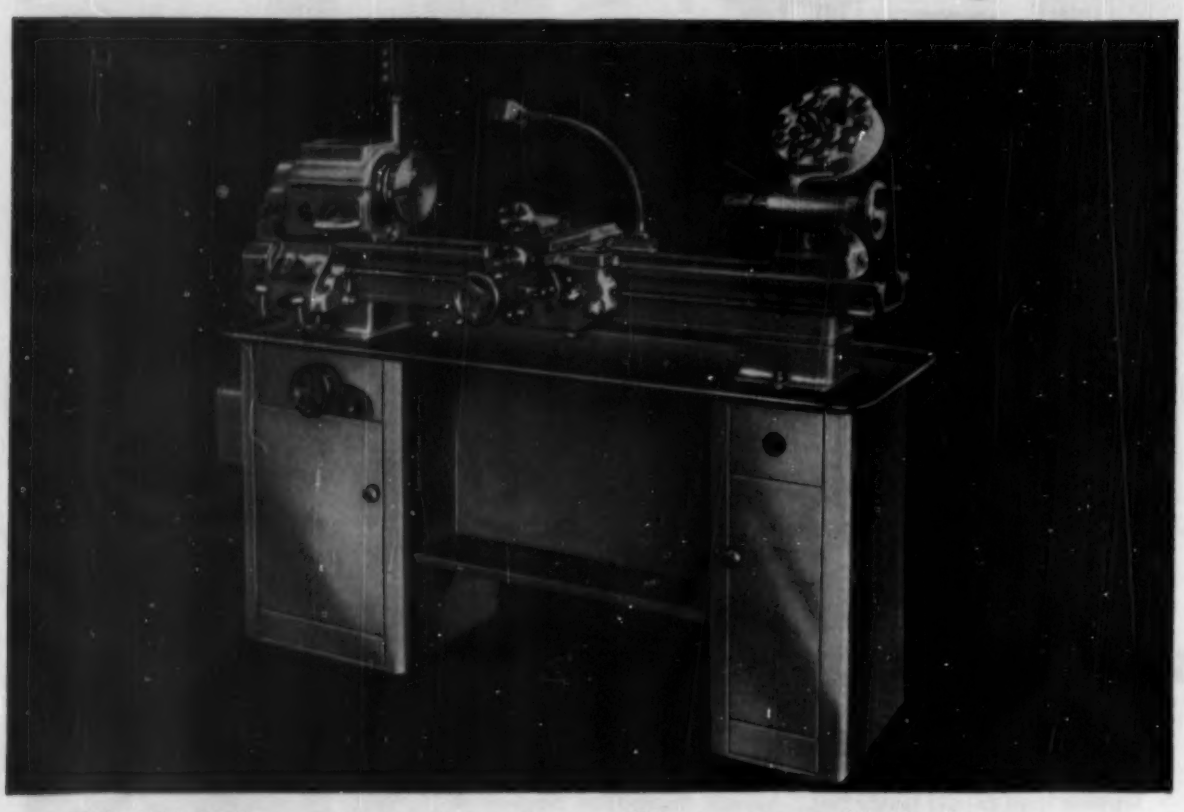

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
JANUARY 1956

Our Social Heritage Demands—

Industrial Arts in Elementary Education

C. J. GERBRACHT
Professor of Industrial Arts Education
State University of New York
Teachers College at Oswego
Oswego, N. Y.

While there has been a recent emphasis on industrial arts and construction activities in the elementary school, the idea is anything but new to American public education. Construction activities in the elementary school are based on precedents dating back to the early nineteenth century in the history of schools in the United States.

At the same time it must be admitted that early concepts of the place and function of manipulative experiences have undergone some rather drastic revisions in the course of more than a century.

Available records indicate that the earliest attempts to include practical, manipulative-type work in elementary schools were designed to serve two main purposes. The more often mentioned of these was to develop certain tool skills thought to be basic to many manual operations and trades — homemaking as well as industrial trades. In keeping with this idea a lot was said about manual dexterity and hand-eye co-ordination. The school desired to lay a foundation for the sort of work for which many of its pupils were destined. And second it was thought that manipulative experiences would provide for constructive use of leisure time, thus serving a social purpose as well as a vocational one.

Industrial Schools at Boston

As the notion of manipulative work gained supporters a number of industrial schools were developed, notably in and around Boston (1860's and later). Attendance at these schools was not permitted to take the place of regular public school attendance, and only a relatively few public school pupils attended the industrial schools or industrial courses in the public schools. These were often conducted on Saturdays or after regular school hours. The purposes of these courses were still substantially as stated above.

It was not until the 1880's that a significant new wrinkle was included in the construction-activity concept. About this time Dr. Felix Adler, one of the founders of the New York Society for Ethical Culture, was instrumental in establishing the Workingman's School in New York. Adler's interest centered around the plight of the working classes, for whose children he wished to provide practical-type school work which might make it possible for these children better to earn a livelihood. Further, he wished fervently to inculcate a feeling of dignity for labor through deep understanding of principles involved in tools, machines, and processes. This understanding, he felt, was much to be preferred over mere performance of menial tasks without knowing why they had to be performed or understanding the basic principles underlying them. But his unique contribution was his effort to relate the manipulative experiences of pupils "organically" to the rest of the school studies. He felt, for example, that aesthetic values and mathematical and physical principles would be much better taught through working with material things.

The Rise of Manual Training

Encouraged, no doubt, by this broader point of view, leaders in the industrial-education movement began to take the position that manual activities were important no matter what the future vocation of a pupil might be. Thus the emphasis on foundations for trade vocations began to decline in favor of an emphasis on the pedagogical values of manipulative experiences.

As the popularity of manipulative experiences, known at the time as *manual training*, spread to other school systems in the East and Midwest a significant change in method took place. In early experiments the work a student performed very often did not result in a

useful product, but only in some sort of exercise, as for example a wood joint. Later, however, still in the 1880's, more and more school shop programs produced objects of value, which spurred the work to ever greater popularity. The projects produced were, to be sure, fairly small. Usually they were arranged in a series, so that succeeding projects were increasingly difficult. But the fact that the finished product had some utilitarian value made the whole manual training movement more attractive to all concerned, and certainly more defensible from a pedagogical point of view.

In the period from 1890 to 1910 efforts were made to answer three main criticisms of the manual training movement. One of these criticisms held that too much emphasis was placed on skill development and not enough on knowledge related to production. Another criticism was that little or no concern was given to good design in the products constructed. And the third criticism was that no attention was given to relating construction activities to the rest of the curriculum, even where such relationships were most obvious.

As attempts were made to remedy the second defect noted above, the work took on a nature better described by the term *manual arts*, and this term gradually replaced *manual training* in the literature.

Though some progress was made in remedying the first two defects mentioned, little was done in those years to relate manual-arts activities to the rest of the school program, except in isolated instances. In large measure this failing is with us, even today.

In connection with this last point it must be said that the followers of Herbartian methods (becoming significant in the United States in the last decade of the nineteenth century) went even further than *relating* construction activities to the rest of the school program. From their point of view construction activities served best when they were used to *facilitate* the teaching of the regular subjects. Such activities should not, they contended, have a sequence of their own at all, but should be used as a technique to illustrate and otherwise assist in the teaching of science, mathematics, language, and social studies. And so the emphasis on tool skills was further reduced.

A still further attack on the formalized sequence of manual activities was implicit in John Dewey's *School and Society* (1899). Dewey conceived of *industrial occupations* as the very core of the school's program in the lower elementary grades. Very briefly it was his idea (demonstrated in his laboratory school at the University of Chicago) that school experiences should start with real activities, and that subject matter should be learned when and where its need becomes apparent in the course of carrying on the activity.

While the idea as stated by Dewey was not practiced to any great extent, at least exactly as Dewey stated it, nevertheless it did serve to cast further doubt on the validity of a sequence of graded manipulative exercises of even *useful* products.

Most of those who sought to *interpret* Dewey's point of view (always a popular sport for school people) preferred to retain the logical subject-matter sequence in the school's curriculum. But more and more construction activities were expanded from the mere skill emphasis to include also appreciation and understanding of industry and (a fairly new idea at the time) intelligent selection and use of industry's products.

The New Term — Industrial Arts

Once more the term applied to construction activities, manual arts, was deemed inadequate, since the products to be selected and used wisely were more and more the result of mechanical rather than manual processes. And the industries to be studied became more and more mechanized as America came of age. Since 1904, when it was first suggested, the new term, *industrial arts*, has gained wide acceptance as properly describing the work done.

From time to time in the history of education there emerges a personage who attempts to reconcile divergent points of view in some sort of compromise plan. In this field such a person was Dr. Frederick G. Bonser of Teachers College, Columbia University. His point of view, set forth in Bonser and Mossman, *Industrial Arts for Elementary Schools* (Macmillan, 1923) and elsewhere, encompassed many of the ideas thus far suggested and included some new ones. It should be remembered that there were now two principal schools of thought as regards industrial arts in the elementary school. One conceived of industrial arts as a subject-matter field, valid for its own content, designed primarily to develop manipulative skills, but taking some account also of information related to production. The other conceived of industrial arts activities as means or method in the teaching of standard subject matter — illustrative or motivational in character.

Bonser conceived of industrial arts as both content and method, but not merely as set forth by the two factions described above. Rather, Bonser's proposal more closely followed Dewey's lead. To him, the work of the elementary school should include ". . . those elements of study which are of common value to all. . . ." He admitted the validity of such studies as science, mathematics, language, and social studies, but asked further: "Is there not also a body of experience and knowledge relative to the industrial arts which is of common value to all, regardless of sex or occupation?"

He went on to suggest that attention be given to the study of foods, clothing, shelter, utensils, records, and tools and machines as vital concerns of everyone. He admonished, however, that these studies are of value for their subject-matter content, not merely in order that manipulative skills might be developed. He then conceived of these studies as means or a method because of the various understandings and appreciations of the cultural heritage which would inevitably result.

Thus we have reviewed hastily the principal points in the evolution of theories regarding the place and function of industrial-arts work in elementary education. In practice today schools run a wide gamut of these practices variously combined.

At present most elementary programs involve a study of the cultural heritage, including many of its industrial aspects. Indeed, it is difficult to imagine teaching social studies without reference to the arts of industry which have played so vital a role in establishing our social order. But it should be noted that this is often attempted without providing any manipulative experiences with tools and materials. The story of our people engaged in mining, lumbering, power production, construction, manufacturing, transportation, communication, and other industrial pursuits can be told with words alone. But to do so denies the greatest lessons of modern psychology. How much more likely our pupils are to appreciate the significance of industry when their own hands perform many of the same tasks! The teacher who makes no provision for such experience neglects a technique which would aid him materially in doing the things he is trying to do.

"Fiber Metallurgy," a new metallurgical technique developed at Armour Research Foundation, may lead to an *entirely new use of metals*, promises better filters and rapid cooling of jet engine components. Other applications, based on *high stiffness-to-mass ratio of fiber bodies*, may be in aeronautical skeletons to support plastics, active catalyst and battery masses, ceramics, or friction materials. The process uses short metal fibers as building blocks, somewhat like powder metallurgy does with metal powders. — *Industrial Research Newsletter.*

It Is Time to Study—

Automation and Industrial Arts

MORRIS TISCHLER
Teacher of Electronics
Forest Park High School
Baltimore, Md.

There has been considerable material written about the automatic processes of industry, which John Diebold[1] has coined Automation. What will be the effects of automation on our secondary schools and, more specifically, how will it affect industrial arts? Some writers have envisioned mechanical robots taking the place of man, as well as organizations which are controlled and operated by electronic brains called analogue and digital computers. If we are to believe these writers, then we must justify the teaching of hand operated tools and machinery in the arts program. Certain areas of instruction may have to be added and some removed from the curriculum. The secondary school compares favorably to many industrial firms which manufacture a product. Problems of production are similar, and it is interesting to note the many comparisons that do exist.

The fact of the matter is that many writers are playing on the imagination of the layman. In the first place, automation does not apply to all organizations equally well. Transportation, professional services, and most retailing find it difficult to adapt to the automatic process. Many automatic devices for machines have been designed to aid in their operation or control, but that is not automation. When a man pushes a button, as in the ringing of a doorbell, he is operating a one way system of control. However, if the housewife places soiled clothes in a machine which washes and dries them without interruption it may be said that this process is automatic. The damp dry machine or the separate drier would be improvements over the washtub, but it still requires the housewife to do the handling and thinking. The completely automatic device does away with the control by the housewife and often produces a better end result at less expense. Automation could, therefore, be defined as the application of automatic devices which control, operate, and correct errors of production and clerical machines. The building of robots to replace such inefficient machines as man would be a waste of time and material.

[1] *Automation*, John Diebold, D. Van Nostrand Co., 1952.

Industries That Lend Themselves to Automation

Certain industries lend themselves to the theory of automation. Soft drink manufacturing is a good example of automation. Bottles, water, and syrup are fed into the machine which performs the remaining operations. Inspectors are still necessary as well as truck loaders. It is feasible to replace these few men since photoelectric cells could inspect and special loading belts could move the materials on to the truck. In the more complex industries, such as radar and television, construction of the automatic process lends itself more to the semicontrol than complete control. The problem involved is that of short runs and production changes. Complete automation of some components, however, are possible. The National Bureau of Standards has developed a pilot plant for the building of certain electronic components. The modular process, as it is called, is a good example of mixing ceramics and electronic techniques to produce an end product automatically.

It is easy to see that automatic processing and the shift of even a few labor forces are going to be of concern to all of us. The manufacturing of materials by more efficient machines with greater production output usually means a higher standard of living for all. The speed with which problems can be solved and arms produced provides us with a better defense program. The shift of labor from certain types of jobs will be slow but accepted. The machine age has brought higher wages for less work and it is to be expected that its continuance will increase with no sudden changes but with gradual advances.

What are the contributions of secondary education to automation? We in the teaching profession have started to feel the effects of the transition. Many of us can see that some changes are necessary in curriculum or course outlines. Such changes would mean new projects or experiments to some, while others may have to add new information. After several years of teaching, some teachers are not willing to upset, to any degree, their teaching material. Industries are also faced with the same problem, and they have to decide to what extent and how rapidly the changes can take place. Teachers are given semitempered materials which are to be molded into a product, called man. Frequently the tempered material is greater than we would like and molding becomes difficult. In the hands of the teachers are the powers behind the system of automation. How well the digital computer functions, or how many new techniques can be devised to cut production time are all by-products of the teacher's main production item. Pure academic teachers and industrial-arts teachers share in the responsibility of maintaining an efficient production line. Our product derives from the language arts department the ability to communicate with peoples in his environment. With the proper polish he receives the green light to advancement, but if the finish is coarse or crude, he remains a reject. Science, both natural and social, is inserted so that man can understand better the theories and laws that others before him have evolved. These are necessary to understand environmental conditions to which we are all exposed. In the process of training, man is taught to express his scientific thinking in terms of numerical expressions. In many cases, unusual as it may seem, the product decides how much numerical expression he requires. Our product only differs slightly from that of other concerns, however since there are many metals which will not take certain types of fin-

ishes. Man continues to move through a series of fine polishes called music and the fine arts until he is ready to sell himself to the consumer.

It seems that in the manufacturing of our product, we have overlooked a very important operation. Industry calls it model making. Before the product ever gets to final production, a model is made to determine the actual size, shape, appearance, and operation. At times the model making has been omitted, but only at the expense of many rejects in final assembly. Where is the model shop in our educational system? Why, of course, its industrial arts. The academic teachers drill and grind into the product all kinds of information which is most important for him to understand, but the final modeling is left up to the industrial-arts teacher. In the laboratory the arts teacher explains in great detail the concepts poured into the product, and permits the product to show some ability to operate in a controlled environmental condition. To the instructor is left the job of translating terms and equations as well as introducing many new facts upon which our computing and translative device can perform. If under laboratory tests the product does not perform as the designers planned it, it is usually left up to the model shop to suggest changes. Seldom, however, is our product sent back to the designers as in industry, but it is left to the model shop to make alterations before placing it into final production.

The model shop or industrial-arts shop, as we know it, offers man the opportunity to understand and work with materials he will use in future occupations. From the model shop comes an understanding of materials such as wood, metals, and ceramics. Our experimental product is able to make minor designs and lay out new ideas which he can visualize from experiences gained in mechanical drawing. He has acquired a new sense of expression along with communications and mathematical equations.

Another test is needed before the product is ready for release, and that is his efficiency. How easily can our product perform his operations on wood and metals? Are there short cuts in operating the milling machine or has he been told that maybe man does not always have to operate machines? Is it possible to control large powerful operations by the throw of a switch, and if so, how can it be accomplished? These are all questions which could be answered in the electronics shop. Yet this subject is still hidden in the stock pile of general knowledge. When will our product be exposed to the effective controls which the field of electronics offers man? One of the keys to complete automation lies in the application of electronic controls to mechanical devices. Yet man travels the conveyor belt with a minimum of exposure. As an electronics teacher, I have tried to find out why our finished products seldom return to take up positions in our professional industry. It would appear that most of them see no challenge in teaching simple electricity and little projects. Then, too, when they were able to compute and translate they were looking for their part in the building of automation devices. The teaching of electronics is most important and an understanding of it is necessary by all members of the model shop. No one is untouched by its influence.

Above all, industrial arts contributes greatly to the area of human relations. Where would our product be if he were not taught how to live, share, and work beside others. In industrial arts, one learns that a place exists for everyone on some level. Our products, whom we call our boys, learn that ours is a competitive enterprise and each one must perform to his utmost to secure a desirable position in society. To perform to his utmost means to strive to meet life's perplexities and to make suitable adjustments.

To meet the challenge of the era of automation we, as teachers, must remain broad in concept, and be willing to make adjustments when necessary. Student-class participation is to be encouraged, since everyone wants to feel that he contributed to the advancements made by the group. Simple projects by themselves often serve to isolate students rather than bring them together. Team work in the shop by a group project or single product as in industry brings everyone closer and helps develop human relations. After all it is not the project we want to develop, but the boy.

In our hands lies the power of automation. What are you going to do with your power?

Test Items Should Serve a Dual Purpose

Test Items That Teach

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The procedure-rearrangement item is one form of objective testing which has long been neglected by teachers of industrial subjects. Too often, in the past, we have overworked such test forms as the true-false, multiple choice, completion, and the like. Here, however, is a *new* test item which not only has unique teaching and testing advantages, but also has high interest and appeal to students. As the name implies, procedure-rearrangement items require a student to rearrange or renumber a group of selected statements so that they present an entire procedure or cycle of events in correct order or logical sequence. These test items are a *natural* for industrial education, a field rich in step-by-step procedures, operations, directions, and methods.

Rearrangement items purposely have been called *test items that teach* because not only are they testing devices but teaching aids as well. They develop reasoning and judgment and encourage an organized, methodical approach to the solution of a given problem. Teaching and testing go hand-in-hand and one should always test in terms of his teaching. That is, if a student is expected to know or to be able to do something, then it is only reasonable that he be tested for that knowledge or skill. The *know-how* or informational aspects can be tested through conventional test forms. The *be-able-to-do* or skill aspects probably should be tested

with manipulative-performance tests. Unfortunately, however, the advantages of performance tests are frequently offset by handicaps and limitations in administration and subjective scoring, particularly when used with large groups of students. Procedure-rearrangement test items will not solve this problem completely, but they do offer a convenient and objective means to test the knowing aspects involved in manipulative operations, sequences, or procedures. These test items are not substitutes for performance tests, but it is readily apparent that they can serve a testing need which cannot be met by other conventional paper and pencil test forms. In one rearrangement problem a whole series of testable items can be integrated into a single objective test question or problem. In this respect, rearrangement items are unique. They are easily constructed, lend themselves well to most types of technical subject matter, and as paper and pencil tests, work equally well with small or large groups of students. For these and other reasons previously mentioned, procedure-rearrangement items are a worthwhile addition to the testing program of any teacher of industrial subjects.

Examples

The following samples of procedure-rearrangement items have been drawn from trade and industrial subjects such as auto mechanics, plumbing, welding, and refrigeration. Three styles of directions have been included. Note in each problem that the first step or answer has been given to serve not only as an example to the student, but also as a starting point of the cycle or procedure.

1. *Directions:* Each item in the following problem represents a stage or step in the *combustion process of a four-stroke gasoline engine.* In the space provided, number each item so that the steps occur in correct order. The first step has been numbered correctly as an example.

Value: 6 points

.... Expanding gases move piston.
.... Spark ignites gas mixture.
.... Piston compresses gases.
1 Intake valve opens.
.... Fuel mixture enters cylinder.
.... Exhaust valve opens.
.... Intake valve closes.

2. *Directions:* Rearrange the following items in the proper order or sequence for *shutting down oxyacetylene welding apparatus.*

Value: 10 points

.... Turn oxygen-regulator screw to relieve pressure on diaphragm; close torch oxygen valve.
.... Close oxygen needle valve on torch.
.... Open torch oxygen valve and drain oxygen hose and regulator.
1 Close acetylene needle valve on torch.
.... Open acetylene valve on torch to remove pressure on working pressure gauge of regulator.
.... Close acetylene cylinder valve.
.... Close oxygen cylinder valve.
.... Turn acetylene-regulator screw to relieve pressure on diaphragm; close torch acetylene valve.

3. *Directions:* In the space provided, number each item so that the steps occur in their correct order. The first step has been numbered correctly as a starting point.

Making a Vertical Calk Joint in Cast-Iron Soil Pipe

Value: 10 points

.... Smooth joint with wide iron.
.... Pack oakum into joint.
1 Wipe hub and spigot ends of pipe.
.... Calk outside edge of joint.
.... Align ends of soil pipe; space joint evenly.
.... Use inside iron to make inside edge of joint waterproof.
.... Pour lead into hub of joint.

4. *Operating Cycle in the Absorption System of Refrigeration.*

Value: 8 points

.... Ammonia gas is absorbed by a weak solution of water. Hydrogen gas returns to evaporator.
.... Hydrogen gas and liquid ammonia mix in evaporator; ammonia gas evaporates to cause cooling effect.
1 Heat is applied at the subgenerator.
.... Strong ammonia liquor enters the subgenerator.
.... Ammonia gas rises to upper part of the generator.
.... The hydrogen and ammonia gas mixture passes to absorber.
.... Liquid ammonia drips into evaporator.
.... Ammonia gas enters condenser and is condensed.

Marking the Items

Procedure-rearrangement test items are quickly, easily, and objectively scored by means of a simple marking procedure. The individual items are weighted equally, but the problem as a whole may be given any desired value or weight. A typical problem is marked in the following manner.

Lighting an Oxyacetylene Torch	*Student's Responses*	*Answer Key*	*Difference*	
Value: 6 points				(4–3)
Spark the lighter near the tip of the torch. . .	4	3	1	1
Adjust oxygen torch valve so that the ragged flame changes to a bluish cone.	6	6	0	
Adjust acetylene torch valve so that the yellow flame burns about one eighth of an inch from the tip.	5	4	1	
Hold welding torch in right hand; hold lighter in left hand.	1	1	0	
Open oxygen valve slowly to permit air in line to escape gradually.	2	5	3	
Open acetylene valve about one quarter of a turn.	3	2	1	
				—
				2. *Sum of Differences* 6

1. Find the numerical difference between the answer key and the student's response for each item.
2. Find the sum of these differences.
3. Determine student's grade or score by reference to the "Grade Table" below.

With a little experience in grading these items, it will be found that the differences and the sum of the differences can be computed mentally without need to record them on the paper.

GRADE TABLE

Sum of the Differences	*Value of Question: 6 points*	*Student's Score in Points*
0		6
2		5
4		4
3 6		3
8		2
10		1
12		0

Theory of the Marking Procedure

One of the most interesting aspects of procedure-rearrangement items is the theory by which they are marked or graded. A student is not marked as either completely right or wrong, nor is he marked completely wrong because he misplaced one answer which consequently displaced every answer following it. On the contrary, he is marked according to his degree of rightness. The deviation of his responses from a

PRECIOUS STUFF!

The world's costliest oil, a blend of petroleum derivatives and other products, is being produced in a miniature refinery at the laboratories of a large watch company. Two drops of the oil, which costs $7,560 a gallon, will oil 1100 watches. This one still refines enough oil to keep pace with lubrication needs for all the watches made in the United States. — *Petroleum Newsnotes.*

perfect score is computed and he is given credit for the nearness of those responses. The technique by which this is accomplished is best understood by consideration of a typical problem.

In the following four-item problem, a perfect score would be one in which the student's responses matched the correct responses perfectly.

Correct Order of Responses	*Student's Responses*	*Difference*
1	1	(1—1) 0
2	2	(2—2) 0
3	3	(3—3) 0
4	4	(4—4) 0

Sum of Differences = 0

Note that there is no difference between the correct order and the student's order. The sum of the differences is zero and complete positive correlation exists.

A zero score would be one in which the student was completely wrong and one in which the sum of the differences would be at the maximum. The most a student could be wrong would be to reverse the steps completely by making the first step the last one and the last step the first one, etc. This would be an example of complete negative correlation.

Correct Order of Responses	*Student's Responses*	*Difference*
1	4	(4—1) 3
2	3	(3—2) 1
3	2	(3—2) 1
4	1	(4—1) 3

Sum of Difference = 8

The sum of differences simply represents the difference, divergence, or degree of wrongness of the student's responses from a perfect score. In the above examples a total difference of eight means that the student is completely wrong, while a difference of zero means that he is completely right. In between these extremes lie other values of rightness or wrongness. Assume the above problem has a value of eight points, the grade table would be as follows.

Sum of Differences	*Student's Score in Points*
0	8
2	6
4	4
6	2
8	0

It would be relatively easy to make a grade table for any desired point value, such as 5, 6, or 10 points.

Before a grade table can be constructed for a particular problem, however, it is necessary to know the maximum sum of the differences. These sums may be determined quickly by reference to the following table which lists the maximum possible difference for three to fifteen items.

Number of Items in Rearrangement Problem	*Maximum Sum of the Differences*
3	4
4	8
5	12
6	18
7	24
8	32
9	40
10	50
11	60
12	72
13	84
14	98
15	112

Or, determination of the sum of the differences can be calculated for any number of items by means of the following formulas which were derived for this purpose by Russell Meyers.* Use formula 1 for rearrangement problems with an even number of items and formula 2 for those with an odd number of items.

Formula 1 $\quad \text{Sum of Differences} = \frac{X^2}{2}$

Formula 2 $\quad \text{Sum of Differences} = \frac{X^2-1}{2}$

Where X equals the number of items in the problem.

For example, an eight-item problem has a maximum sum of the differences of 32 while a seven-item problem has a maximum difference of 24.

$$\frac{X^2}{2} = \frac{(8)^2}{2} = \frac{64}{2} = 32$$

$$\frac{X^2-1}{2} = \frac{(7)^2-1}{2} = \frac{49-1}{2} = 24$$

Note that it is desirable in rearrangement items to number the first step to serve both as an example and a starting point for the student. Since the first step is given, be sure not to count it as an item. In using either the formulas or the table, the number of items is always one less than the total number of items in the problem.

In making up a grade table, it is interesting to note that the steps in the "sum of the difference" column will always be in even numbers whether an odd or an even number of items was used in the problem.

* Education Specialist, Marine Corps Institute, Washington, D. C.

Hints for Constructing the Items

1. Select an important process, procedure, technique, method, etc., which seems readily adaptable to this type of testing.

2. List the separate steps or stages involved. Subdivide or consolidate these into clear-cut, logical, sequential divisions. For best results the number of steps probably should not exceed ten. Experience has shown that the optimum number seems to range from six to eight steps depending upon the subject matter involved.

3. Make the steps easy to understand. Avoid flowery descriptive language and superfluous "a's, an's, the's, then's," etc. Remember that you are trying to test the student, not tire or confuse him.

4. Avoid leaving clues in your steps so that an alert student can figure out the sequence simply by your sentence structure or choice of words.

ANSWERS TO REARRANGEMENT PROBLEMS

(1)	(2)	(3)	(4)
6	8	7	7
5	2	3	5
4	7	1	1
1	1	5	8
2	5	2	2
7	3	6	6
3	4	4	4
	6		3

Electronic firewatchers — television cameras in forest lookout towers — now are being used to relay television pictures of surrounding areas back to forest headquarters. The system of television monitors and rotating, remote controlled cameras was demonstrated by Raytheon Manufacturing Company to the Forestry Conservation Communications association. — *Industrial Research Newsletter.*

Table by woodworking student at the Tucson, Ariz., Sr. High School. Teacher, Delbert Shadley

Photo by Jim Baumer. Submitted by Harry A. Goldstein, instructor of photography

Improve Teaching Through—

In-Service Training

DONALD F. PETERS
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Arlington County, Va.

The promotion of better teaching through in-service education is one of the prime objectives of the Arlington County School System. The County School Board of Arlington has been exceedingly farsighted in foreseeing the advantages of in-service training for its school employees. It has set aside a total of ten days during the school year for the upgrading of teaching personnel. All departments in all areas are providing excellent training opportunities for its teachers.

Arlington's industrial arts and vocational education department is at present experiencing growth in two directions. It is expanding and enriching its present curriculum offerings, and there is an increasing demand by students for the type of offering made by this department. These problems involve a co-ordinated effort on the part of all personnel connected with our program.

Any problems of growth point out the need for a co-ordinated effort between administrators, supervisors, and instructor personnel. Industrial arts and vocational men represent a wide and diversified range of industrial experience. Within our ranks are men who are recognized specialists within their field. Industrial-arts teachers must be well versed and reasonably skilled in several industrial areas. Good teachers are developed only after years of experience and unremitting effort on their own to improve themselves. It is one of the purposes of these workshops offered by the school board to have our specialist in the field to instruct and pass on to the other personnel their so-called "tricks of their trade."

Demonstration of electrical testing equipment by Bruno Paras, electronics instructor

The co-ordinated effort of any system offering an industrial arts-vocational education program confronts innumerable obstacles that must be surmounted before a continuing program may be offered. Each division has problems which are interrelated with each other. Students experience in the junior high school an industrial-arts program which is exploratory in nature. It is a result of this experience which determines if the student will continue on with his vocational training at the high school level. In many cases his final shop experience at the high school, being vocational in nature, terminates in employment of the student. A student must experience a successful start in the industrial-arts program if he is to continue in the same direction upon entering the high school. For this reason a close working relationship between junior and senior high shop personnel is a prime factor in the success of the vocational program.

We feel this relationship can be materially fostered if the teachers in both schools have an understanding of each other's program. The in-service training period is a definite boon to achieving this objective.

Three-day in-service training dates were scheduled in September prior to the opening of school. Industrial arts and vocational men met as a group in one of our junior high schools. Prior to the meeting date a leader, recorder, and blackboard recorder had been selected and had met and drawn up the general agenda for the meeting. A tape recording explained how to conduct one's self during a *group meeting*. This was discussed, and served as a guide for the conducting of all future meetings. There was a great deal of enthusiasm over the switch from the administrator run meeting to a meeting which was conducted by the teachers themselves. These three days of in-service training offered the opportunity to outline our program for the year, discuss in full a training film schedule, and to lay plans for future expansion of our program. Time was ample for each group to get together and organize its own problems.

Three days of the Thanksgiving week had also been set aside during the school year for in-service training. The first of these days was a conducted field trip to the U. S. Naval Gun Factory in Washington. This trip proved very enlightening. The opportunities of the Naval apprenticeship program were outlined and discussed in relation to our own program.

The ideas gathered on the trip served

Demonstration of the Multilith process by Charles Buckley, instructor of vocational printing

Photographs by Andrew Elses, Clarence Halstead, and Ross McNeil.

as a working guide for our vocational personnel as our vocational program also is geared to serve the apprentice program in industry. The possibilities for future apprentice training of our graduates left us with a new and accurate conception of naval training opportunities. The men also came away with some ideas on shop practices.

The second day was set aside for a full day's discussion of teaching aids. Dr. Donald Maley of the University of Maryland came prepared with a truckload of teaching aids and materials. Each aid was presented and its practical application was discussed emphasizing its use in the classroom. It was encouraging to note that a number of teaching aids were constructed in the weeks following that discussion and presentation.

The third day was used as a follow-up of our field trip and discussion of the use of teaching aids within our particular department.

The dates January 29 and 30 also were scheduled as in-service training dates. The meetings on these days offered us an opportunity for another type of *needed in-service training*. A training program of actual shop practices in the skills necessary to conduct a well-rounded shop program was offered. Many of these skills are not taught in all college programs and are acquired in the field by the instructor only after accepting his first position. Prior to the scheduled dates, a questionnaire was sent out to each individual instructor asking that he complete the questionnaire requesting demonstrations in any field that he felt the need of instruction. The men were offered the opportunity to work in any area of need. There was also the opportunity to construct sample projects, teaching aids, have technical questions answered, and to check out on equipment with which they wished to become familiar. It also offered us the opportunity to co-ordinate our mechanical drawing between the junior and senior high schools.

From the requests that were returned the following schedule of demonstrations was organized and duplicated so each instructor would know what demonstrations were being offered, at what time and place, and the instructor demonstrating. The following schedule represents the two-day offerings.

Upon completion of the workshop, an evaluation sheet was filled in by all participating members. It took very little diagnosis to ascertain that this type of workshop was highly valued by all members of the instructional staff in their schools.

The final two workshop days, scheduled in April, found the industrial-arts men discussing with George Wallace, assistant state supervisor of trade and industrial education, Virginia's new proposed state course of study in industrial-arts education. From this workshop we emerged with a concept of the general direction Arlington's industrial-arts department will take in adapting the state course to its present existing program. This discussion provided a real growth and reawakening of ideas in our industrial concepts.

Our vocational men, during the same period, visited a regional technical school. This was followed up with a discussion of existing school problems.

The industrial arts and vocational instructors, who participated in these workshops, would like it to be known that the co-ordinating of any successful program is essential in promoting its immediate growth and long-range plans. They also feel it is only when there is an actual working together with fellow workers on common problems, that a successful solution may be found. It is from these workshops that the real esprit de corps emerges. When it does, it reflects itself in our offerings to our students.

Demonstrations	*Instructor*	*Day & Time*	*Place*
Carburetion	Andrew Elsea	Thurs. 9:15	Auto Mech. Shop
Lathe Turning Centers	Ernest Parry	Thurs. 9:15	Metal Shop
Welding (Arc)	Don Peters	Thurs. 9:15	Metal Shop
Drill Bit Sharpening	Don Peters	Thurs. 10:30	Metal Shop
Radio Circuits	Bruno Paras	Thurs. 10:30	Electronics Shop
Taper Cutting Jointer	John Duncan	Thurs. 1:30	Woodshop
Amplifier Construction	Bruno Paras	Thurs. 1:30	Electronics Shop
Saw Filing	Don Peters	Thurs. 2:30	Woodshop
Operation of Testing Equipment	Bruno Paras	Thurs. 3:00	Electronics Shop
Acetylene Welding	Ernest Parry	Fri. 9:00	Metal Shop
Foundry Demonstration	Don Peters	Fri. 9:00	Metal Shop
Aluminum Welding	Don Peters	Fri. 10:30	Metal Shop
3 Wire Timing Light	Andrew Elsea	Fri. 1:30	Auto Shop
Lathe Bit Sharpening	Ernest Parry	Fri. 2:30	Metal Shop

Save Students' Eyes by—

Eye Protection in the School Shop

GERALD W. SHIPMAN
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The *100 per cent eye protection* program instituted by instructors LeRoy Luther and Ben Standen at Benton Harbor and St. Joseph High Schools' machine shop classes is paying off. Mr. Luther reports "since the wearing of goggles became a shop rule here last October, students have not reported a single case of eye injury. *Foreign body in the eye* is a fairly common complaint around the average small shop, and we have had our share. Before we installed this program, we used to average about two first aid cases each week and twice each semester a visit to a doctor.

Students at Benton Harbor High School shop, showing safety glasses board and its use

"In the major industries, eye protection has become of prime importance. Many Twin Cities plants insist on eye protection worn by all workers, and even visitors from the office or outside the plant. When training young people for future industrial careers we want them well grounded in all the best shop practices — including safety. Good eyes are essential for any type of mechanical work."

With the approval of Russell Adams, vocational director for both school systems, Mr. Luther rigged up a clear plastic peg board on which hang 36 goggles of suitable sizes. This is rigged so it can be lowered into a neat dip tank filled with a sanitizing solution. At the end of each class period the goggles are hung back on the panel and lowered into the tank. By the time the new class has assembled, the goggles are ready for use. The panel is raised by the new class, the goggles rinsed in warm water and dried on paper towels. In this way 36 pairs of goggles accommodate an average of 150 students each day.

Occasionally a student has objected to the use of the goggles. Usually an explanation of the purpose of the campaign is sufficient. Students are allowed to provide their own goggles, but so far no one has exercised the option.

Mr. Luther has received some National Safety Council posters and literature through the Twin Cities Area Safety Council. Other signs and gimmicks have been made at school or locally.

The program arose out of a visit paid to the high schools by a Committee of Industrial Safety men some months ago. Vocational Director Adams proposed to the industrial division of the Twin Cities Area Safety Council, of which he is a member, that teams be formed to survey with the teachers, the safety factors needed in the school shops. Said Adams "the purpose was not only to provide better protection for the students now and make us all more safety conscious, but also to prepare the student for the type of safety practices he might find later in industry. It also gave us the impetus to make some long needed improvements in our shop layouts and housekeeping."

The findings of the teams were written up and submitted for discussion by the teachers and the vocational departments' advisory committee. A whole meeting was devoted to these reports — one of their most productive according to some members. In one case a ventilation layout suggested by the industry men proved to be much less expensive though just as efficient as one recommended by an outside consulting engineer. Most of the other suggested improvements are now happily in operation. An ingenious plastic guard developed for circular saws by Hilbert Klotz, the Benton Harbor woodshop instructor, deserves special mention.

Now the shoe is on the other foot; now Mr. Adams, Mr. Luther, and the others hope some of the smaller industries men will visit *them* and pick up ideas on how to run a safe shop, so their graduates won't be disillusioned.

Metal grinding "by ear," often claimed possible by skilled operators, may have some foundation in fact. According to a University of Michigan professor, high-frequency vibrations reduce temperatures in ground surfaces, reduce incidences of thermal cracks, and minimize effects of hardness within a grinding wheel. — *Industrial Research Newsletter.*

A Worth-While Experiment —

A Reading Program in Place of English I

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Perhaps it is best to warn the reader that this report is not for the expert. There are no little o's wandering loose, or long involved tables of figures, for this program was not handled by statisticians but by three English teachers: one cadet teacher with an M.A. but with no actual teaching experience; one with an M.A. degree and five years' teaching experience but none with reading; and one with an M.A. degree and ten odd years of experience in reading with various groups.

For many years the Phoenix Technical School has been experimenting with its English program: writing its own grammars with a shop slant; using literature or not using literature; and sometimes reverting to standard workbooks. At times small remedial reading classes were set up but they were handled on the basis of school facilities rather than upon student needs.

However, grammar did not seem to *take* to any large extent and there were always complaints from the shop instructors that students couldn't read the technical material that is part of modern shop instruction. Since many students deliberately picked the Technical School, with its three-hour shop courses, because they were not interested in printed symbols or anything academic, it began to look like the old hen vs. egg argument. For present purposes, it was decided that reading should come before grammar.

Our reading program was thought of more as a *brush up* in reading efficiency, rather than as remedial reading. Remedial reading — real remedial reading — requires experts in that particular field and small classes; we did not claim to be experts, and we certainly did not limit classes. But with our *brush up* program we determined, to the best of our ability, at what level a student could read; then we attempted to show him how he could do a better job —

how he could become more efficient — beginning where he was.

The reading program at Phoenix Tech took in all first semester freshmen. It was called English I and it took the place of the usual workbook-grammar procedure of most English I classes.

The mechanics of the program were these: After the freshmen had been assigned to their English classes, and during the first week of school, they were all given an Iowa Silent Reading Test. We preferred the elementary form as that had no material covering poetry and, in general, tested as high a level as we needed in our work.

After all freshmen had been tested, they were divided within each class, on the basis of their performance, into five groups. The first four groups worked on graded practice readers which consisted of reading material and answering questions on that material; the fifth group was made up of students who read at the ninth-grade level or better. These last students used a freshman literature book for their reading work, rather than a practice reader.

Students in the practice readers started work at the level indicated by the results of their Iowa Silent Reading Test. As they completed one book, they progressed to the next one and eventually quite a few of them worked themselves into the literature group.

Working a class of thirty or forty, divided into five levels, presented some problems. The four groups in the practice readers were all doing similar work while they were progressing at their own rate. They needed quite a bit of help and a lot of it had to be individual help. In this situation, the minority group — those in the literature books — were sometimes neglected. Since they *were* interested in reading, *made* no fuss, and *needed* no help, you can understand why they were occasionally neglected.

However, all five groups worked together on some phases of the reading program. We used a workbook that was developed at Tech with exercises on alphabetizing, using an index, following directions, reading and making graphs, and skimming. All English I students used this workbook.

During a week's time, we used the tachistoscope and took speed tests in reading. We had three different sets of books which were published for this purpose and found that they worked out very well for this phase of the program. All students worked with the tachistoscope and with the speed tests. We also tried to use the reading accelerator when and where possible.

Book reports were taken off the list of requirements and put on the *extra credit* list. Since there were no study halls at Tech, classes went to the library once every two weeks for an hour of free reading. Occasionally, on alternate weeks, a hundred or so books were placed on the librarian's cart and wheeled into the room for extra reading time. The librarian made good use of clear, plastic book jackets and we observed that the *new look* books sold very easily and rapidly. Incidentally, book report requirements were dropped in all English classes and library circulation took a nice jump upward.

At the end of the semester another form of the Iowa Silent Reading Test was given in order to evaluate the program.

We found that a total of 389 students took the first and second tests. This showed an average of about 32 students in the 12 classes, but because it was impossible to test students who entered late, classes varied from 30 to 40. And, of course, there were those who started, took the first test and later dropped out. These students are not considered in the final statistics.

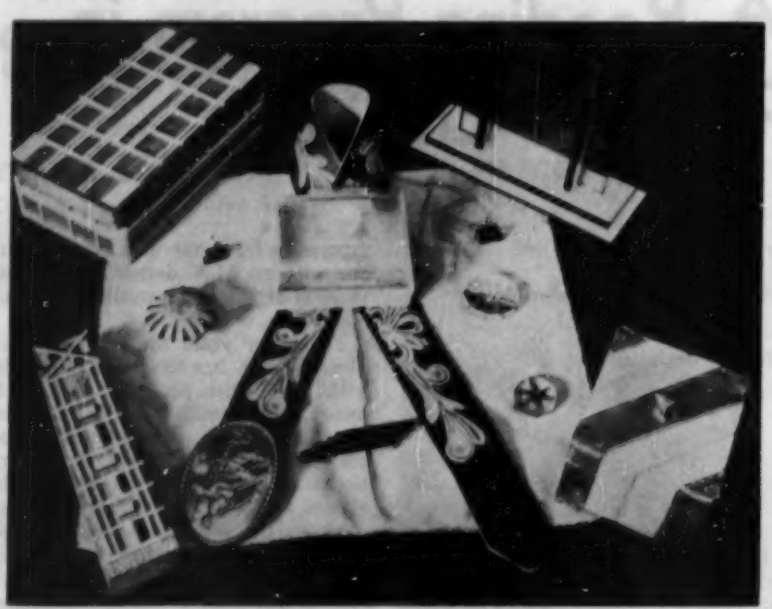
The range of scores for the first test was from the 2.8 grade level to 16.3 (the highest score the test gives); the range for the second test was 4.0 to 16.3. The median score for test 1 was at the 7.5 grade with about 24 per cent of the students reading at the ninth-grade level or higher. The median score for test 2 was 8.7 with 46 per cent of the students reading at the ninth-grade level or better.

When the results of individual classes were examined there were found many sudden *shifts* in individual ability — a gain of seven years in reading ability; a drop of four years in ability, etc. This could be explained in several ways: lack of skill on the part of the instructor, the fact that a single test isn't a final (and always reliable) indicator, and the student at the moment. However, these wide variations were minimized in the large group. They were indicative of an undesired result and should be carefully checked and evaluated.

A median gain of 1.2 years in reading ability in four months' time seemed to be the chief result, and the fact that 22 per cent more of the freshmen could read at the ninth-grade level was pleasing. It will be interesting to compare next year's results with these figures. Experience should bring about better results plus a smoother operation.

Our English I program was strictly a reading program, but that did not mean that we planned to drop all thought of reading as soon as a student completed the course. English II will concentrate on spelling, vocabulary, study habits, and the use of certain study tools such as the dictionary and encyclopedia. But English II will also cover quite a bit of reading. We plan to use one of the printed monthly magazines plus our library facilities for this purpose.

With this start, we plan to develop a reading program all through the four years a student is with us. To make English I a success, the work with reading should be a continuing process — continuing for four years.



A photograph by Renie Bardeau, an advanced photography student. This is a sample of some of the work done in the arts and crafts class at the Tucson Senior High School, Tucson, Ariz.

— Submitted by Harry A. Goldstein, instructor of photography

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

ANOTHER INSPIRING STORY

FRANK C. KENLEY, a veteran of World War II, lost his eyesight in an accident at an army air force base where he served as a ground crew mechanic. The sight of one eye is gone completely, the other has only dim light perception.

His education, before the war, had been terminated at the end of the second year in high school. His work experience included odd jobs in farming, plumbing, and lumbering.

When he was released from the hospital after the accident in the army, he applied for training under the vocational rehabilitation act. Vocational counseling tests at the Veterans Administration Office showed that he possessed the requirements to make a good teacher.

He was permitted to enroll at the University of Chattanooga even though he had not finished his high school course, and he was provided with a reader so that he could keep up with his study assignments. In 1952 he received his B.S. degree, with a major in psychology.

His first teaching job was at the Pond Springs School in Chickamauga, Georgia. Here he taught sixth-grade classes and got along very well. When his principal was transferred to the Rossville Junior High School, he took Kenley with him.

In his new position Kenley has charge of the study halls for all grades, and does the advising and counseling both for studies and future careers. Besides this, he does the trouble shooting with the restless and unsettled students.

It is well to set the accomplishments of such men as Kenley before the students of your classes. He shows what can be done if a person has the will to strive for a goal. The extreme handicap under which he works makes him still more appealing, and the fact that he gets along so well with the sighted pupils in his classes, shows that these boys are gentlemen enough not to take advantage of his disability.

PUBLIC RELATIONS FOR INDUSTRIAL ARTS

IN A discussion of this subject at the Industrial Arts Conference held at Chicago, Ill., on November 11, 1955, Dr. E. W. Tischendorf, Kent State University, Kent, Ohio, presented the following:

Public relations of this kind are necessary to improve the public's understanding of the nature and function of industrial arts in education.

They are also needful in recruiting young men for the teaching of industrial arts.

They help to improve or secure co-operation and support of industrial-arts programs by the administrators in institutions of higher learning.

This publicity also aids in bringing about a harmony of understanding between those who are served by the industrial-arts program. The groups, so served, are: students from the seventh and twelfth grade; industrial-arts teacher candidates (arts majors and minors); teachers of potential industrial-arts teachers; and parents of such students. Also administrators and members of the college faculty.

The media in which this publicity may be used are college and noncollege publications; films, both motion and film strips; letters to teachers, graduates, parents, students, and others who want or need this type of information; and special occasions like mothers' and fathers' days, etc.

The material that Dr. Kinker presented should be very useful to those who want to publicize industrial-arts education, and for that reason it is presented here.

A WORTHY EXAMPLE

THE iron and steel industry of the United States had the lowest disabling injury rate in its history during 1954, according to American Iron and Steel Institute statistics. On-the-job injuries resulting in lost time decreased both in frequency (number of disabling injuries per million man-hours worked) and in severity (total days lost per thousand man-hours worked).

The reports from companies that represent 95.7 per cent of the total 1954 steel production, showed a rate of 3.85 disabling injuries per million man-hours worked, compared to 4.75 which was the low in 1953. This represents a reduction of 19 per cent.

The severity of occupational injuries was reduced almost 20 per cent from the 1953 report. In 1954 the rate was 0.87 days per thousand man-hours worked, against 1.08 in 1953.

These improvements in safety practices did not just happen. The iron and steel industry for some time has been one of the safest industries in the country, according to the reports of the National Safety Council. The industry has done remarkable work in building safety into the equipment with which its workers have to toil.

Information of this kind should have a good influence on both the teacher and the students in the school shop. If an industry that was noted as being dangerous years ago can gain such a reputation for safety, a little more effort to make the school shop safer than it is, will undoubtedly succeed, too, and our students will be more fit to take their place in the work-a-day world later on.

SEASON'S GREETINGS

JANUARY 1, 1956, is just in the offing. It is customary for centuries to wish others good luck at the beginning of a new year. World conditions that confront us, however, make it seem almost like mockery to go on wishing others a happy new year.

It is difficult to become very enthusiastic about world conditions if one sees all those who want to veto everything that is proposed at the United Nations deliberations — governments that enslave their own and other people; flannel mouths who speak about democracy and hold elections in which but one name appears on the ballot for every governmental office.

But why continue? A Merry Christmas and A Happy New Year, and a hearty God bless all right-minded people.

DOES IMPROVED TECHNOLOGY CAUSE UNEMPLOYMENT?

THE U. S. Chamber of Commerce reports that close to nine million new jobs have been created since World War II.

This huge increase of new jobs covers all industries except agriculture and government jobs. The largest increase in jobs, according to this report, took place in the retail trades, in manufacturing, construction, and the service industries, and all of this took place during the era of an expanded technology which had not existed up to that time. These facts seem to prove that improved ways of doing things seem to create rather than destroy jobs.

Problems and Projects

MODERN BOOK ENDS

MICHAEL RHEA
Industrial Arts Instructor
Pacific Beach Junior High School
San Diego, Calif.

The basic design of the book end shown in this article lends itself to many different applications. Most obvious is the variation possible in their size. The diameter, thickness, and number of pieces is a matter of individual taste. In the picture are two pairs of different size, yet both are equally attractive. One has 3 pieces, and the other is made up of 4 pieces.

To make an attractive grain pattern more appealing, the stock can be glued so all the grain runs one way or in opposite directions. Alternating light and dark wood such as pine and walnut, also makes a pleasing contrast.

In assembling the pieces all of them are nailed and glued, except the last one. The last piece, which is the smallest, is fastened only with glue, and the entire assembly clamped with C clamps. The book ends may be finished with clear varnish and wax or with wax alone.

Two views of the modern book ends

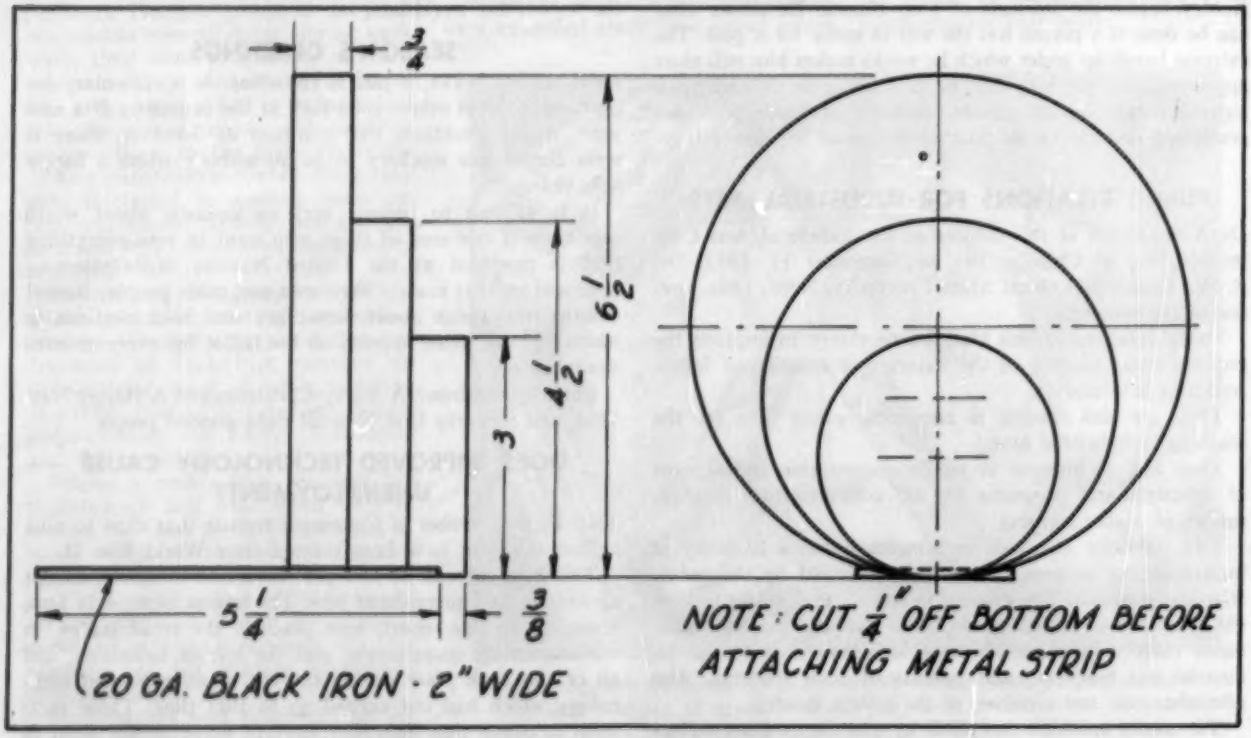
WROUGHT IRON IN INDUSTRIAL ARTS

DONALD G. LUX
Assistant Professor
College of Education
University of Illinois
Urbana, Ill.

Industrial-arts teachers are ever alert to technological changes that are evident in America's industrial economy. For this reason consideration is given here to the phenomenal post World War II increase in the production and sales of wrought iron furnishings. The skyrocketing popularity of contemporary wrought iron is evidenced by the hundreds of these objects displayed in leading furniture and department stores and their ever increasing annual sales volume, which has already reached into the tens of millions of dollars.

Many industrial trends offer little for implementation in the school program because of the tremendous cost of the simplest representative equipment and of the involved technical-scientific nature of the processes. The skyrocketing development in contemporary wrought iron furnishings does offer numerous opportunities for the general shop, metals, or welding teacher to keep his program current. It also offers an excellent media through which the beginner may become interested in studying related aspects of the most prominent single industrial and occupational area — the metal industries.

Compatible With Objectives. The need for offering metalworking in a program purporting to reflect modern industry is made apparent by the fact that steel alone leads all other industries both in the number of wage earners and the value of its



Details of the modern book ends

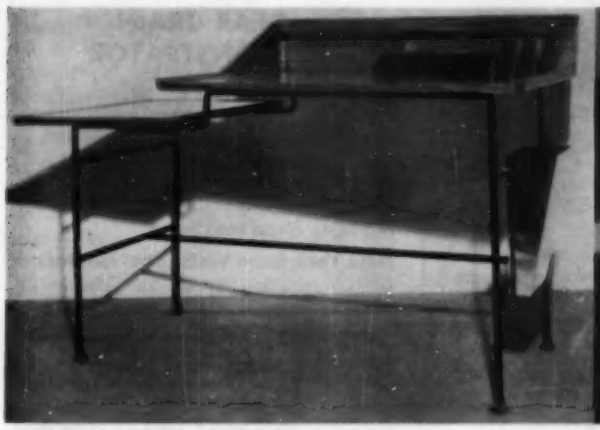


Fig. 1. Desk with compartmented wood top and steel base. Fig. 2 (at right). Desk with wood top and steel angle base

products. To this can be added the workers in the many nonferrous industries and their valuable products. In recognition of this need, metalworking areas have grown in number until they finally are challenging the traditional woodworking and drawing areas which are less significant industrially.

One of the blocks to the spread of metalworking in industrial arts has been the lack of projects which offered instructional opportunities and were popular with students. Now with the appearance of contemporary wrought iron furnishings metal can compete on an equal basis with other traditional materials throughout the household. Because wrought iron blends so readily with other materials, it can also be combined with many other products in a multiple area program.

Ideal Construction Material. Wrought iron, as a neutral material of construction with neither color nor inherent surface design, is an ideal material for the contemporary designer. Because of its neutrality, it can be combined with any color or form of modern industrial material. Because of its strength and ease of forming and joining it can be fashioned into lightweight, irregular, thin forms which would be difficult or impossible with some of the traditional construction materials. Because of its ease of maintenance, it is a boon to the busy modern housewife. Wrought iron requires no waxing or polishing and can be refinished or touched up with little mess or difficulty.

From every standpoint, wrought iron appears to have a definite and permanent place in modern living, and there is little justification for ignoring the trend on the basis of its being only a temporary fad.

Materials and Equipment Are Low Cost. The cost of working wrought iron, both to the individual and to the school, is one of its greatest advantages and will aid in promoting its widespread adoption. Many youths cannot afford to make expensive projects. In this regard, it is encouraging to note that many wrought iron projects selling commercially for more than one hundred dollars can be made in the school for less than ten dollars. Smaller items can be made for considerably less than a dollar.

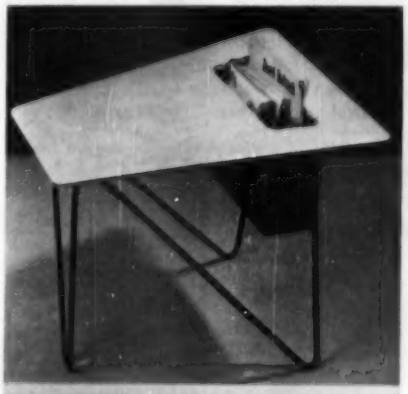


Fig. 3. Table with steel base and wood top

Fig. 4 (lower). Easy chair with steel frame and foam rubber seat and back

— Jan Versnel photos

From the school's standpoint, the outlay for tools and equipment can be very limited, and the most de luxe area for fabricating wrought iron projects can be equipped for considerably less than the cost of a planer and table saw or a metal lathe and milling machine. The former case concerns a total area, while the latter two examples list only two items for other areas. Even a large capacity bending machine with all attachments, see Figure 5, costs only a fraction of what is required to purchase a production model of most traditional machines.

Puzzling Terminology. The term *wrought iron,* which is used exclusively in classifying contemporary ironwork, lends itself to at least two interpretations which could quite properly be called misinterpretations. If the term is derived from the material from which the objects are fabricated, it is a misnomer. Mild steel, which is quite similar in properties to wrought iron, is universally used in the construction of wrought iron furniture. If the term is derived from the process of manufacture, it also is technically incorrect. The word *wrought* does properly mean hammered, formed, manufactured, processed, or beaten into shape by tools, and it is also the past tense of work. The name could therefore be taken to imply *worked* iron. However, the word *iron,* as previously mentioned, should technically be *steel.* Of course, this is a common misuse of the word iron, and the term wrought iron, as applied to contemporary ironwork, probably comes from the process of manufacture rather than the material of construction. In this article wrought iron is given this latter interpretation.

The various shapes and sizes of mild steel bars and rods and tubing (which are used to make wrought iron projects) are handled by most hardware and metal distributors. Perforated and expanded sheet metal, commonly used in conjunction with mild steel shapes, are frequently more difficult to obtain, although many large metal

Fig. 5. Bending machine for forming bars, rods, and tubing

distributors across the nation do handle wide varieties of expanded and perforated sheets.

Problems in Teaching Wrought Ironwork. Perhaps the most prominent problem is that posed by the need for welding facilities for many projects in the field. Several solutions to this problem are possible. The first, and perhaps most desirable, is to secure through rental or purchase, some type of welding facilities, preferably gas. Arc welding is generally unsuited to this type of work because of the high incidence of brazed joints and because of the necessity for smooth work which requires little or no filing. Other solutions are to hire the work done in commercial shops, to restrict the work to nonwelded projects, or to have students in other, more advanced classes do the welding.

Other problems, such as working out means of forming neat, accurate bends, and of providing adequate storage room for the many large projects which can be made in this type of work, must be solved in terms of the individual situation and what is available. Financially able schools may be able to provide equipment such as the bending machine in Figure 5, while others will have to use homemade equipment or the less efficient hand forming methods.

Workaday problems such as the above and others such as locating sources of supply, the shortage of literature in the field, and the necessity for finding techniques to perform certain processes are frequently encountered. These can largely be solved through the ingenuity of the average instructor.

Variety of Work. The student's project design must take cognizance of available materials and processes. The projects[1] pictured in Figures 1 and 2 involve welding or brazing. Those in Figures 3 and 4 employ common fasteners in their assembly.

[1] Project pictures are from the publication *New Furniture* and are reproduced through permission granted by the publisher George Wittenborn, Inc., New York 11, N. Y.

Whatever the choice of materials or processes, wrought iron offers a golden opportunity for original expression in the production of attractive, contemporary projects.[2] It also offers the chance to extend the scope of work in industrial arts to include more of the materials and processes of modern industry.

Summary. The universal popularity of wrought iron furnishings is an accomplished fact if one recognizes actual sales, showroom prominence, and appearance in all areas of modern homes as criteria. Contemporary wrought iron has skyrocketed into popularity and gives indications of remaining as a prominent feature of modern living and functional design.

The area of wrought ironwork offers unlimited opportunity for the amateur craftsman both at school and in the home. It also offers opportunity for industrial-arts teachers to provide educational experiences in the most prominent phase of American industry.

Wrought iron furnishings are economical to make, can be produced with the equipment found in the average metal laboratory, and are in keeping with modern decor. They offer an excellent opportunity to bring the metalworking area up to date, and problems encountered in offering the work can be overcome by the average industrial-arts teacher.

[2] A folder of project ideas can be obtained free of charge by writing to O'Neil-Irwin Mfg. Co., Lake City, Minn.

The nation's proved oil and gas areas total about 125 million acres. — *Petroleum Newsnotes.*

GEAR TRAIN DEMONSTRATOR

DONALD W. PENLEY
Supervisor of Vocational Education
and
FRED ROMINGER
Machine Shop Instructor
New York State Vocational Institution
West Coxsackie, N. Y.

Anyone in the teaching profession is aware of the values of visual aids. And it is probably true that those teaching shop or vocational subjects are more aware of the value of a visual aid in a shop demonstration. This is even more important in shop instruction in a correctional institution, where the constantly changing student enrollment prohibits group instruction as practiced in public vocational schools.

For this reason and due to great interest of advanced students in cutting gears, I found it very beneficial to everybody concerned to make up a gear train demonstrator. Not only did the making of these gears give an excellent opportunity to explain and demonstrate the procedure of cutting gears, but it also is a lasting visual aid whenever the subject of gears arises.

The accompanying illustrations show four-sixteen pitch gears with 92, 46, 32, and 16 teeth respectively. The largest and the smallest gears are fitted with crank handles in order to get the gears in motion and then show the ratio of these

Demonstration gear train

gears. They are mounted so that every gear can be moved individually into any position desired and by doing so demonstrate a different ratio.

This demonstrator is also of great help to the instructor. Such unfamiliar terms as diametral pitch, chordal pitch, circular pitch, addendum, dedendum, working depth, etc., used in connection with calculating, laying out, and cutting gears are much easier to explain to the individual. All in all, this demonstrator is a very handy device to have in the shop as well as in the classroom.

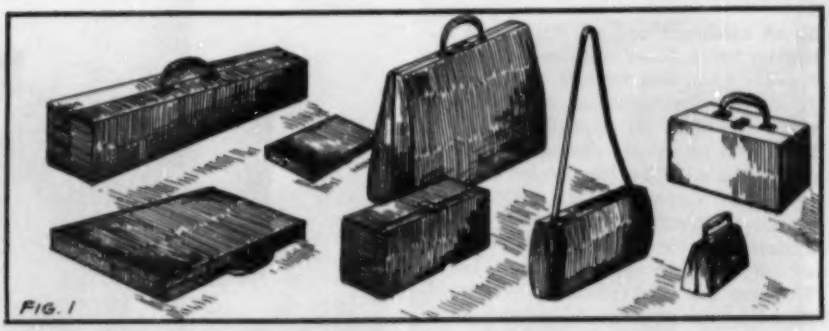


FIG. 1

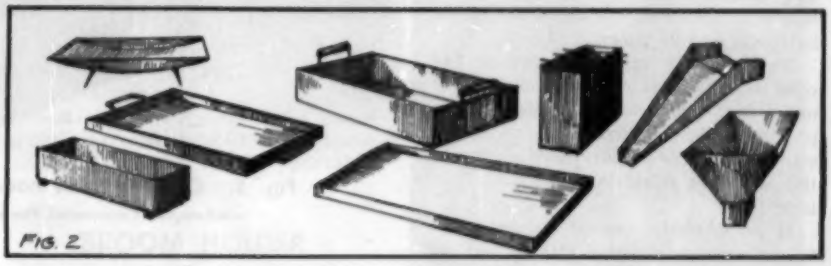
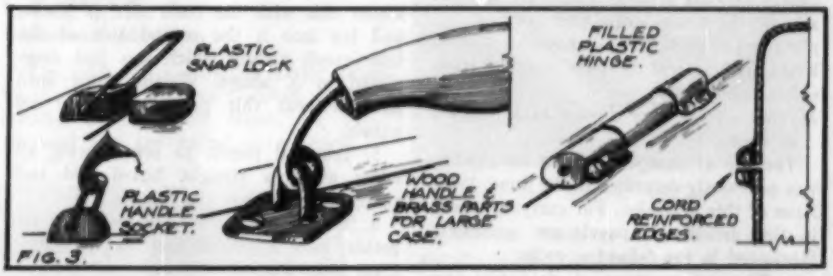


FIG. 2


PLASTIC SNAP LOCK
FILLED PLASTIC HINGE.
PLASTIC HANDLE SOCKET.
WOOD HANDLE & BRASS PARTS FOR LARGE CASE.
CORD REINFORCED EDGES.
FIG. 3.

FIBERGLAS AND HONEYCOMB CARRYING CASES

ALEXANDER F. BICK

Teacher in Milwaukee Schools

The Milwaukee-Downer College

The Stout State College, Summer Session

Strong, lightweight, and colorful carrying cases may be made in any size and shape with Fiberglas. The photograph shows large cases while the drawing in Figure 1 shows many small ones made by the process used in making case 3. Figure 2 pictures further applications of the same process. Some of these items may be made for less than one dollar to the student.

The traveling cases shown in this article effectively take care of the scores of instances when teachers, students, and businessmen need display and carrying cases for shapes that cannot be accommodated out of standard stocks anywhere. This is true also of display and storage cabinets. Whether these are made for very special groups of uses such as for lecture and convention displays, or for housing radio and test instruments, their construction is very simple, as will be seen from the various illustrations.

Carrying case designs are a matter of satisfying functional requirements, using an approximate 3 by 5 proportion, and giving it a fine finish. Just about everyone with a need can design a good case.

It is important, of course, especially at this early stage of shop contact with polyester laminating and casting plastics, that the projects be as simple as possible. There always is a tendency toward premature judgment of a new idea or method which one should carefully avoid when values are at stake, and when evidence is rather impressive on the side of the new material that its use is a much desired experience for students to acquire. We are aware of the hurdle the teacher faces before he has felt the genuine thrill of a firsthand laminating and casting demonstration. It is difficult for him to understand why this series of articles stresses simplicity of manipulation when in fact the project shown appears quite impossible, viewed in the light of traditional methods. Yet, this is precisely the reason polyester methods are successful in industry; they actually do the "impossible" with amazing facility. And this, by the way, is the reason for the writer's interest in the first place. Having worked with laminating and casting plastics for a long period has not diminished the interest nor the conviction that polyester methods are simple enough for any boy; its chemical reactions are a thrill for him.

Traveling cosmetic cases, traveling shaving kit cases, traveling writing material cases, school cases, brief cases, music cases, radio cases, collection cases, and cases for any and all other needs may be shop made in an 80 cent to two dollar price range, when method 3 is used, and somewhat more when methods 1 and 2 are followed. These prices compare favorably with those for comparable wood jobs, and the plastics look better, they are stronger and lighter, more durable and of less bulk.

Making the small book carrying case in Figure 5.

1. A wooden form is made, edges rounded, the whole sanded, coated with three coats of resin for a glass-smooth finish; and when dry it is waxed, covered with Castolite mold release, and waxed, for easy removal of the casting. Thereafter, the steps are:

2. Cut 2 pieces of Fiberglas cloth for each side, ½ in. oversize.

3. Cut out corners to overlap an inch.

4. Place two pieces over the mold ready to cast. Block up the mold.

5. Mix 3 ounces of Castoglas with 1 round full ¼ teaspoonful of hardener. Stir well and apply evenly, using a small brush.

6. After an hour, use a spatula to loosen around edges, and remove the casting by dropping repeatedly on a table on its extending edges. This should gradually lift the casting off the mold.

7. Make two castings and trim them both with a tinner's shears.

8. Set both sides, edges down, on a glass; lay ⅛ to 3/16-in. diameter cotton cord around each, and apply the plastic mix filled with Castosil, a powdered glass. The latter is added in equal amount and stirred into the mix, which then is fed into the joint between the cord and side from the pointed end of a metal or cardboard trough. When hard, remove from the glass with a chisel.

9. Cast a solid bar of filled plastic into a cardboard channel mold. Fill the ends of the mold with wax. The casting should be ⅛ by ½ by 10 in. long. When hard,

file off cardboard, and cut 4 pieces ½ in. long for feet, 6 pieces ¼ in. long for hinges, 2 pieces ¾ in. long for lock, and 2 pieces ¼ in. long for handle socket. Drill and round the hinge pieces, drill one of the lock pieces for a brass ring and shape and groove the other horizontally for the ring snap, also shape all other items. Then cement all pieces with the filled plastic mixture. Provide a fillet of the mixture around each piece and back of each hinge. The area on which pieces are cemented should be sanded rough beforehand. Wire hinge inserts should be in place during the setting of the resin, but avoid having the latter run into its joints.

10. Cover the case with one or two color coats of plastic. Any shade may be mixed from base colors available from the plastic supplier. Illustrations showing the consecutive steps in procedure similar to this are to be found in the March, 1955, issue.

If an all-plastic case is not important to the craftsman, brass fittings may be substituted for step 9. These are on sale at most hardware stores and are best applied with 6-32 by ½ machine screws. Brass fittings will simplify the job considerably.

Making a large rigid display case (Case 2 in Figure 5).

The use of honeycomb core for rigidity was previously described in the June, 1955, issue of this magazine. For carrying case 2 in this article, six panels are separately fabricated in the following order:

1. Wax a large pane of glass. Cut two pieces of Fiberglas cloth to the oversize dimension of each panel. Also cut one honeycomb panel for each. Honeycomb is available from the Castoglas supplier.

2. Lay down the first piece of Fiberglas cloth, mix the resin in the proportion given for case 1, cover the cloth evenly, and allow an hour to harden. Work as many panels at a time as there are glass sheets to work on. Make two separate sheet castings for each panel, and loosen each from the glass in turn, using a sharp chisel.

3. Rewax the sheet glass and lay on it one of the Fiberglas-resin sheets just cast. Cover the latter generously with Castoglas resin mixture, set the dry honeycomb panel into the wet plastic and weight it evenly, giving particular attention to the edges.

4. When hard, lift off of the glass, and lay on the second Fiberglas-resin sheet.

FIG. 4.

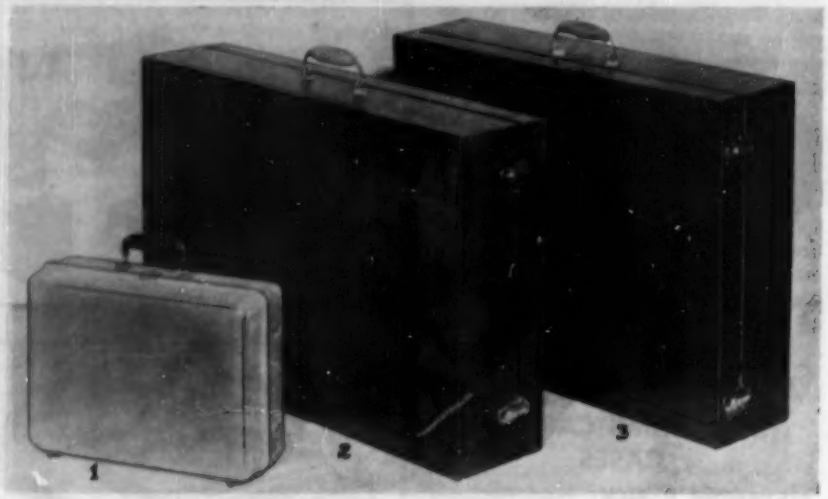


Fig. 5. Carrying cases made of fiberglas and honeycomb
— Milwaukee Commercial Photographers, Inc., Milwaukee, Wis.

Cover this with the resin mix as above, and lay into it the second side of the honeycomb casting which was just completed in 3, above. Weight down until hard. Repeat this process for the six panels.

5. Trim all panels to size, sawing all edges along a straight board laid and clamped down over the casting.

6. The sawed pieces are cemented together into a closed box with Castosil filled resin mix.

7. All open edges are closed with a rather stiff putty mix consisting of the resin mix plus Castosil and sawdust. When hard, sand.

8. Cut the case in two on the circular saw, and again fill edges.

9. Fit the case with purchased hardware using 6-32 by ¾ machine screws. Shelves and partitions are then cut and cemented into position, and drawers and pull-out trays may be made to fit any use by cutting and cementing components from flat-cast sheet. The case is then colored as mentioned for case 1.

Making the large supply case shown third in the photograph.

1. Cut, surface plane, join, and sand the outer ring of four wood frame pieces for whatever case is being made, and assemble the frame with glue and screws, placing the latter so that the finished case may be sawed open at the desired division line. It is understood that though both sides of a finished carrying case have their own frame, they are not made separately: both are made as one frame until the box is recut after its assembly.

2. Cast two separate sides of Fiberglas-resin sheet on a glass, as explained for case 2. Cast them oversize, to be trimmed after assembly. To produce a rigid casting as on the case shown, use two sheets of Fiberglas cloth in the small cases and in addition, use a piece of open-mesh burlap between the two Fiberglas sheets for the large cases. This holds more plastic and makes a ⅛-in. thick wall of considerable strength.

3. Cement and nail the side sheets to each side of the frame, and when hard, trim with a saw, file, and sand the edges all around.

4. If an excellent wear surface is desired on the frame, cover the wood with one layer of Fiberglas cloth all around, trim, and sand.

5. Cut the box on a circular saw, sand the cut, and add the hardware as in case 2. Roughen the entire case and color, as in case 2.

The last described project in its small sized versions, Figure 1, is made of a combination of wood and plastic materials. It is, therefore a good beginning job. It presents plastics in an elementary way (see Fig. 4), and with the experience gained, it would be a natural thing for students to progress into the production of deeply shaped forms such as was described for case 1. The reading of the printed directions should be followed without trouble after having produced the simple side castings required for case 3.

Other applications of the same principle may lead to the development of trays, tanks, drip pans, conveyor troughs, spouts, etc. See Figure 2. While this list is very utilitarian, trays and planters may be made to be as decorative as their use may require. Gold threads and sequins, dried wild barley and milkweed seeds, etc., or designs drawn with colored crayon or with tempera or watercolor on such open-mesh cloth as organdy, may be embedded under the first layer of Fiberglas cloth in the tray bottom or the box sides. Work with Castoglas is creative in the highest meaning of the term.

HANDY TRACING DEVICE

HARRY J. MILLER
Sarasota, Fla.

Making a tracing box involves a project having the basic elements of woodwork and electricity for its construction. At the same time, it is inexpensive and useful enough to arouse the desire of possession that leads the student to do his level best in its making.

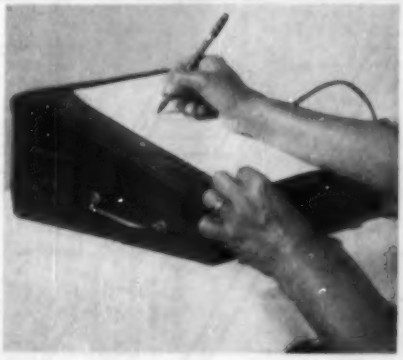
The box, 15 in. long, 12 in. wide, and 6 in. high, sloping downward to a height of 3 in., was made of scrap wood. Atop this slant surface is a piece of glass 9 by 11 in., held down with a small clamp on each side.

The inside is equipped with three receptacles for lamps of different wattages. By means of a three-way switch one or more of the lamps can be turned on.

The interior bottom of the box is covered with a piece of tin as a reflector, and three cleat receptacles wired to a three-gang switch gives variety of illumination, while a handle mounted on each side makes for easy portability.

The glass-topped lid is mounted on hinges, and a hook and screw eye in front keeps the box sealed against dust.

A piece of felt glued to the bottom makes it nonmarring.



This tracing box comes in handy for making tracings. This one is 15 in. long and 12 in. wide. The glass top is held on with a small clamp on each side, and a handle makes the box readily portable

The interior of the tracing box

BROOM HOLDER

E. V. REYNER
Townsend, Mont.

The sides of this broom holder, made by students of Kenneth Goodian, shop instructor at Townsend, Mont., are ½-in. plywood and are nailed to a length of two-by-four. Nails to hold the dustpans are driven into the lower part of the two-by-four. In this manner, all brooms and pans for the shop are kept in one location for easy access.

The broom holder

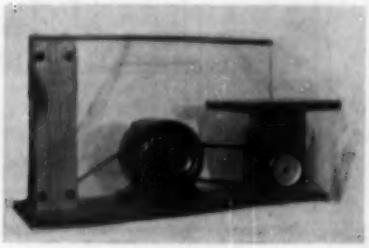
SCROLL SAW

UNO A. SUOMELA
Saginaw, Mich.

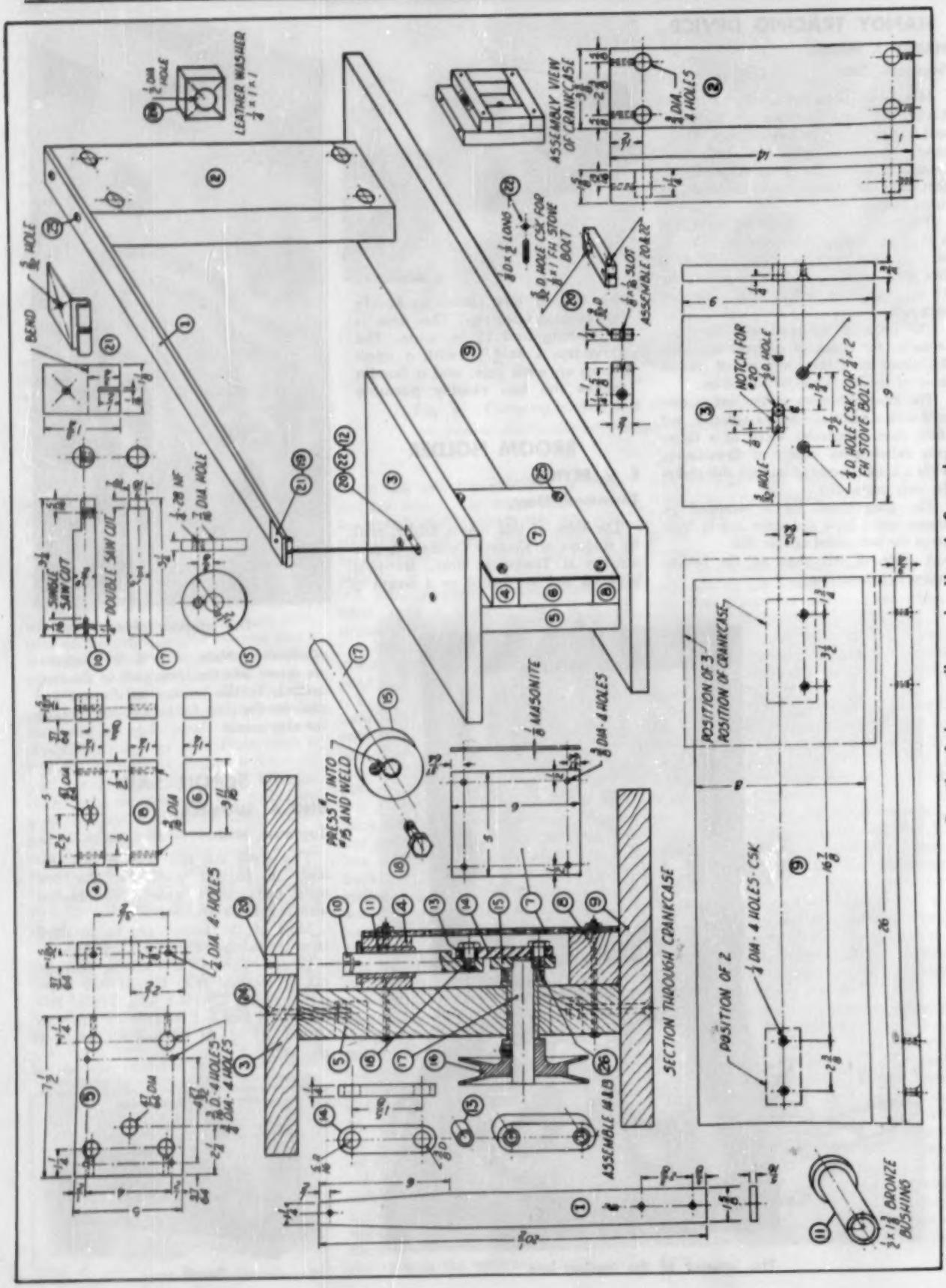
This scroll saw was designed for students in machine woodwork. The few metal parts can be made in co-operation with metalwork students.

Most of the lumber can be obtained from the salvage at the local lumberyards.

Bronze "Compo" oil-retaining bearings can be obtained from Detroit Ball Bearing Company. CS-158-1 with .251-in. ID-377 OD-¼ long — 2 required. CF 675 with .503-in. ID-.753 in. OD and 1⅛ long — 2 required.



Scroll saw



Details of the scroll saw by Uno A. Suomela

One eighth-inch drill rod is used for the roller in part No. 20. This can be heated and hardened in water.

One half cold rolled steel is used for the shafts Nos. 10 and 17. This stock usually comes about .497 to .499-in. OD, so it needs no machining to fit the bearings.

Mild steel is used for the connecting rod and flywheel.

The parts of the frame and the crankcase are held together with stove bolts whose nuts fit into recessed holes.

The saw takes standard 6½-in. coping saw blades. Short pieces of narrow band saw blades can be cut to fit and pine provided to hold the blade in the saw.

The upper blade holder can be made from 14 to 18-ga. sheet metal.

Grease may be used in the crankcase.

A new or used fractional power electric motor will power the saw.

No. 18 (2 required) may be cut from ¼ by 1½-in. hexagonal head machine screws. Leave 1/32 in. more smooth surface on the bolt than the length of the bearing. This keeps the bolt from binding the connecting rod.

Press bearings into No. 5 and No. 4 before assembling crankcase.

Press 19 into 14 using a vise.

Sand smooth and varnish natural; trim edges with red enamel.

BILL OF MATERIALS

No.	Material	Remarks	Size
1.	Birch or maple	Resaw 1-in. stock	5/16 x 15/8 x 20½
2.	Fir	Ordinary 2 x 4	1⅝ x 3⅝ x 14
3.	Plywood	Fir or equal	¾ x 9 x 9
4.	Pine or maple	Use ⅝ stock	15/32 x 1¼ x 5
5.	Pine or maple	Use ⅝ stock	15/32 x 5 x 7½
6.	Pine or maple	Use ⅝ stock	15/32 x 1¼ x 3 11/16
7.	Tempered Masonite		⅛ x 5 x 6
8.	Pine or maple	Use ⅝ stock	15/32 x 1¼ x 5
9.	Plywood	Fir or equal	¾ x 8 x 26
10.	Cold rolled steel		½ dia. x 3¼ long
11.	Oilite bronze		½ hole 1⅜ long
12.	F.h. stove bolt		⅛ dia. x 1 long
13.	¾ Long bronze bushing		¼ dia. I.D. x ⅜ dia. O.D.
14.	Mild steel		⅛ x ⅝ x 2⅝
15.	Mild steel		1½ dia. x ⅛
16.	V pulley		½ x 3
17.	Cold rolled steel		½ dia. x 3¼ long
18.	Hex. hd. machine bolt	Cut to length	¼ x 1½
19.	R.h. stove bolt		⅛ dia. x ½ long
20.	Mild steel		¼ x ½ x 1
21.	14-Ga. sheet iron		1⅛ x 1¾
22.	Drill rod	Harden	⅛ dia. x ½ long
23.	R.h. stove bolt		⅛ dia. x 2 long
24.	F.h. stove bolt		¼ dia. x 2 long
25.	R.h. stove bolt		⅛ dia. x 3¼ long
26.	Leather spacer		¼ x 1 x 1

SCREW AND NAIL GAUGE

E. E. LOWELL

Junior High School

El Segundo, Calif.

The handy shop aid shown herewith is a screw-nail gauge.

It serves very well to put nails and screws that are picked up around the shop back into their proper containers. If accumulated over a period of time a student can separate them without being supervised, leaving the teacher more time with the students.

This shop tool aid may be made of aluminum about ⅛ in. thick. It should be polished for finished appearance.

ADVICE TO PROSPECTIVE MACHINISTS

ALFRED GRAYSHON

Machine Shop Instructor

Olney High School

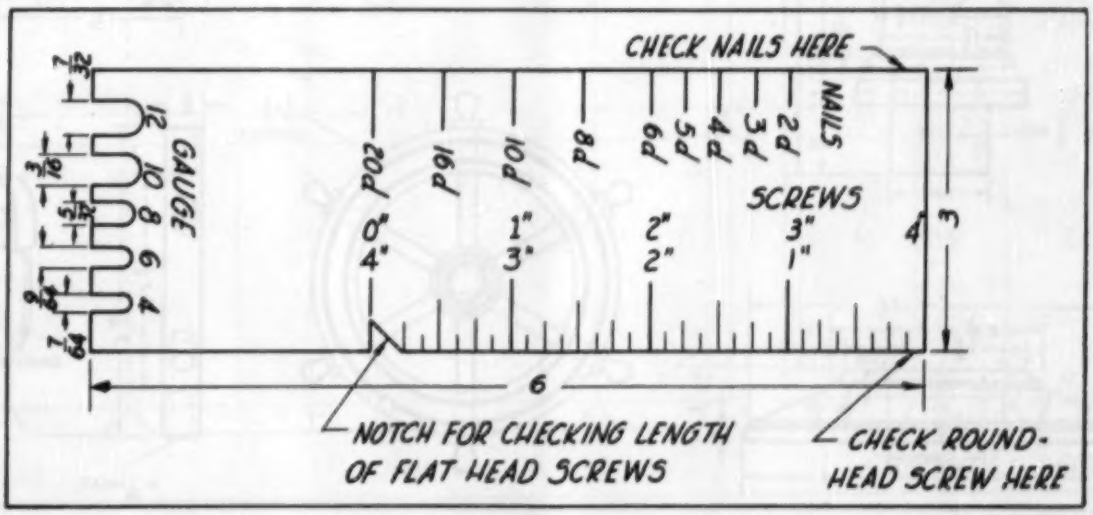
Philadelphia, Pa.

The machinist is the man who makes machine parts and creates out of metal those essentials without which the modern world would not exist. Metalworking is the basis of modern life, essential to every business.

The machinist, no matter what his work, must have certain abilities and possess certain information. A general knowledge of other occupations is of value to the machinist. A high degree of muscular coordination is the prime essential; carefulness, orderliness, accuracy, speed, judgment, resourcefulness, and confidence are other requisites of the machine-shop worker. Accuracy to the thousandths of an inch cannot be attained by a bungling and careless worker.

The machinist should preferably have a four-year technical high or equivalent trade school course. Many machinists have learned on the job without this benefit, but the chances of securing a job and gaining promotion are enhanced by a good educational background.

The individual contemplating a mechanical career should continue studying. He has heard that expression innumerable times but it cannot be overstressed. The new and complex machines require highly trained technicians trained in many divisions of the machinists trade, and have an extensive and well-rounded preparation. It is imperative, therefore, that one must keep up as far as possible with the new developments, processes, and metals. Never think you have learned enough, otherwise you will get out of date too soon.



Screw and nail gauge by E. E. Lowell

SHIP'S WHEEL LAMP

EARL E. LEWIS
Instructor of Machine Shop
Wisconsin Rapids Vocational School
Wisconsin Rapids, Wis.

An attractive, inexpensive machine-shop project that also incorporates work in electricity is this ship's wheel lamp, whose smart, neat lines will make it welcome in any home and an object of conversation. Total cost of the finished lamp, made of inexpensive cold rolled steel, is less than $2. Its many machining operations help students develop skill and versatility.

The parts can all be turned on any lathe having an 8-in. swing. Machining of the hexagon can be done on a milling machine or on a shaper. A vertical mill is ideal for machining the cavity for the electric switch, although one can rough drill and then finish that cavity with a cold chisel.

Materials needed and procedures for constructing the lamp are as follows:

Base 4 by 7/8-in. CRS, column 2 by 4 1/4 in. CRS, wheel, 3 1/4 by 1/2 in. CRS, hub 3/4 by 5/8 in. CRS, 6 spokes 5/16 by 2 1/2 in. CRS, plate 1/16 by 1 1/4 by 1 1/4 in. CRS, small switch, 1/8-in. pipe nipple, 6-ft. electric cord, light socket, shade.

Ship's wheel lamp

Base

Chuck in 3-jaw chuck and face bottom surface; rechuck with bottom surface running true and face top surface. Drill 63/64 in. and ream 1 in. Machine taper, bead and radii, then file and polish.

Column

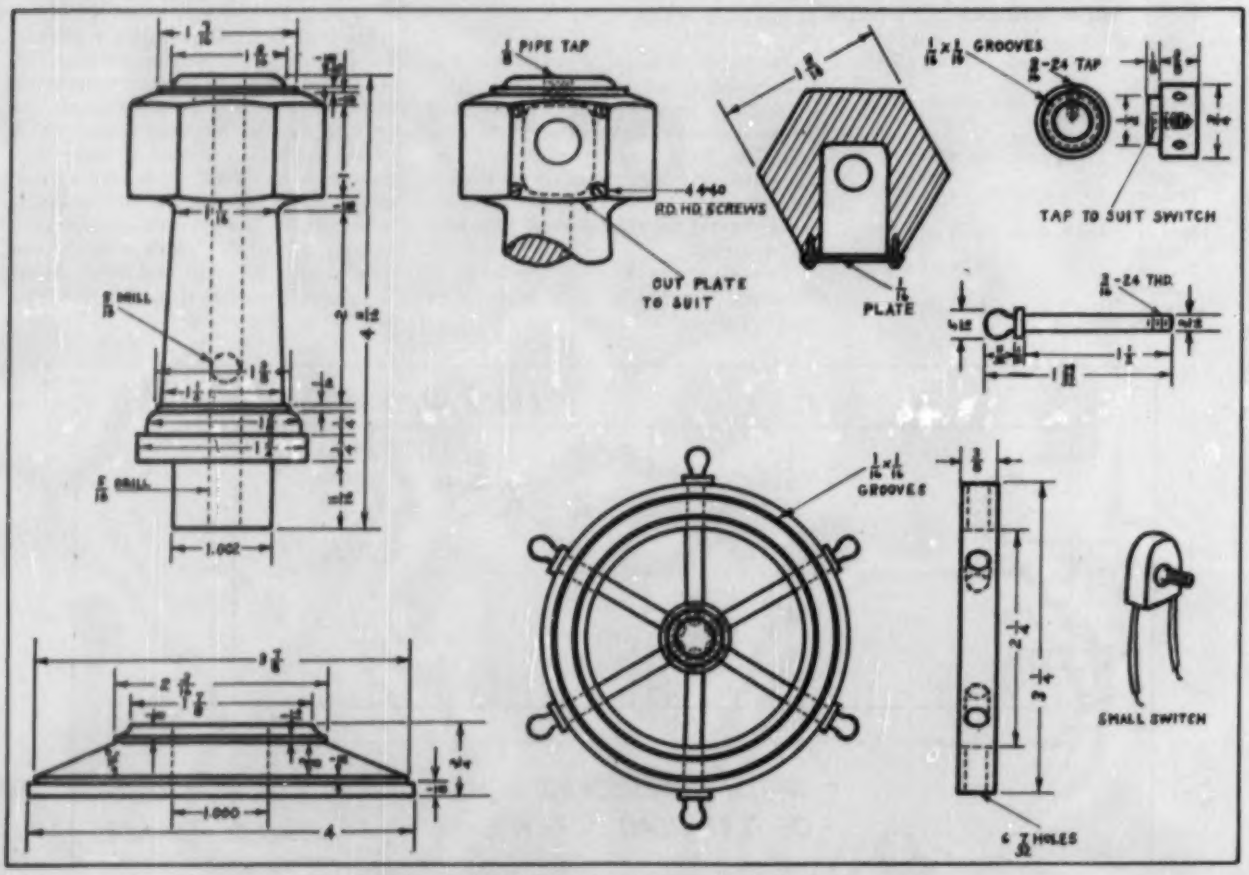
Chuck in 3-jaw chuck; face to length and center. Drill 5/16-in. hole for electric cord. Machine taper, bead and radii. Drill letter R; tap 1/8 in. Pipe thread for socket nipple. Machine the hexagon. Drill 5/16-in. hole for electric cord exit at back of column. Mill on vertical mill or drill and chisel out cavity for switch. Locate 4 holes from plate, drill with number 43 drill and tap 4-40 thread. File and polish.

Wheel

Chuck in 3-jaw chuck; face to thickness, drill and bore to correct inside diameter. Rechuck and turn outside diameter; machine grooves 1/16 by 1/16 in. Layout and drill 6 equally spaced 7/32-in. holes. File and polish.

Hub

Chuck in 3-jaw chuck; face front and cut 1/16 by 1/16-in. grooves. Rechuck and machine shoulder; center drill, drill and



Details of the ship's wheel lamp by Earl E. Lewis

tap to suit thread on switch. Layout 6 equally spaced holes, drill with number 27 drill and tap 5/16-24 thread. File and polish.

Spokes

Chuck in 3-jaw chuck or collets and center drill thread end. Chuck head end and turn shank to 5/16 in.; rechuck and machine head form. Thread with 5/16-24 die, carefully checking amount of thread in order to center hub. File and polish.

Plate

Cut to size, locate and drill 4 1/8-in. holes. Locate hole for switch hole; drill 27/64 in. File edges and polish.

Assembly

Polish all parts carefully. Press column into base. Insert switch, and wire switch to lamp socket and electric cord. Fasten plate to switch, locking with nut on each side of plate. Secure plate to column with 4 4-40 round head screws. Assemble wheel, making sure hub is concentric with wheel. Screw wheel tightly onto switch thread. Check wiring to see if by spinning wheel, light goes on and off. To prevent rusting, clean off oil film and spray with clear lacquer; or have lamp chrome plated. Purchase shade with nautical design if desired.

TOOLBOX

ALFRED GRAYSHON
Machine Shop Instructor
Olney High School
Philadelphia, Pa.

In each school metal or machine shop there is a problem of distribution of certain tools, whether the tool crib is manned by an adult attendant or a student. It takes less time to issue the tools and check in if a number of standard tools for a given machine could be allotted as a unit.

For example, the box shown and described in this article was designed primarily for a lathe. It has five separate compartments and a groove section for two different turning toolholders, two calipers (inside and outside), two machine wrenches, and a 6-in. ruler (scale). It makes a very sturdy box which will last for many years.

Material required:

No. of Pcs.	Material	Size
1	No. 26 black iron sheet	9 by 12¾ in.
2	No. 26 black iron sheet	5⅞ by 8 15/16 in.
1	No. 26 black iron sheet	2 5/16 by 7 15/16 in.
1	No. 26 black iron sheet	1½ by 7 15/16 in.

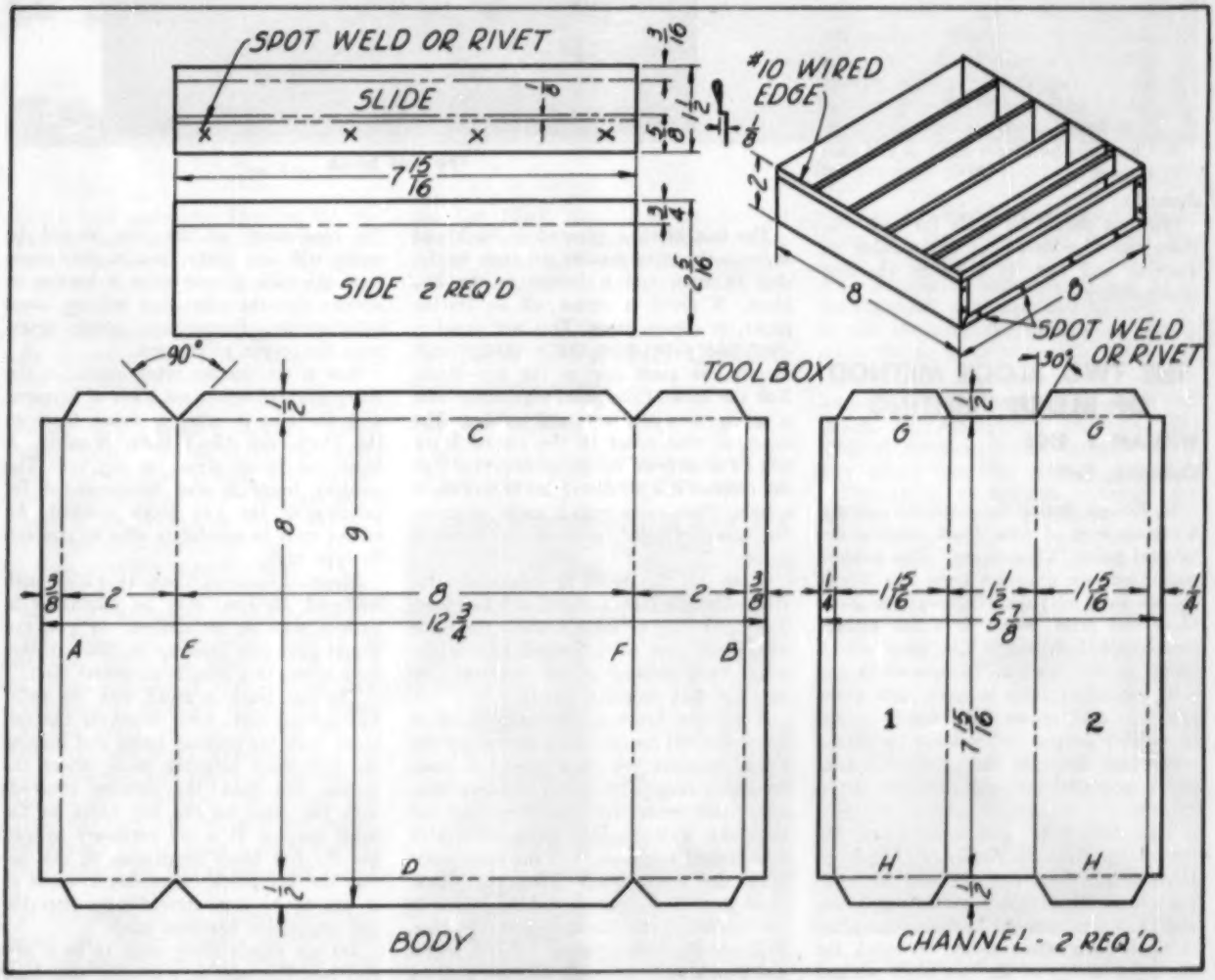
Procedure:

Body:

1. Lay out.
2. Cut out and notch.
3. Make open folds for wire on edges A-B.
4. Bend on lines C-D at right angles to make the lap seams.
5. Bend at right angles on lines E-F.

Sides:

1. Measure and cut two pieces.
2. Make the open fold on one edge of each piece for wiring.



Details of the toolbox by Alfred Grayshon

Channels:

1. Lay out.
2. Cut out and notch.
3. Make single hems on the long edges.
4. Bend on lines G-H to form the lap seams at right angles.
5. Bend at right angles on lines J-K to bring surfaces (1) and (2) parallel.

Slides:

1. Measure and cut.
2. Make single hem on edge L.
3. Make a double right angle bend at M as shown in end view.
4. Attach to surface (2) of one of the channel pieces even and parallel to the top edge by spot welding or riveting with 12-oz. rivets.

Assembly:

1. Insert each side piece against a respective lap seam of the body.
2. Spot weld or rivet each piece in place.
3. Cut a 32-in. length of No. 10 copper coated wire.
4. Start this wire in the center of one of the open folded edges and bend around the body, closing in the sheet metal with pliers to retain the wire.
5. Complete the wired edge with pliers and hammer, gradually working the metal into place over the wire.
6. Locate the channel pieces equally spaced in the body and spot weld or rivet them into place.
7. Clean oily film from surfaces and then enamel.

Remarks:

One box should be made for each machine and identified by a like number on machine and box. It helps in checking responsibility.

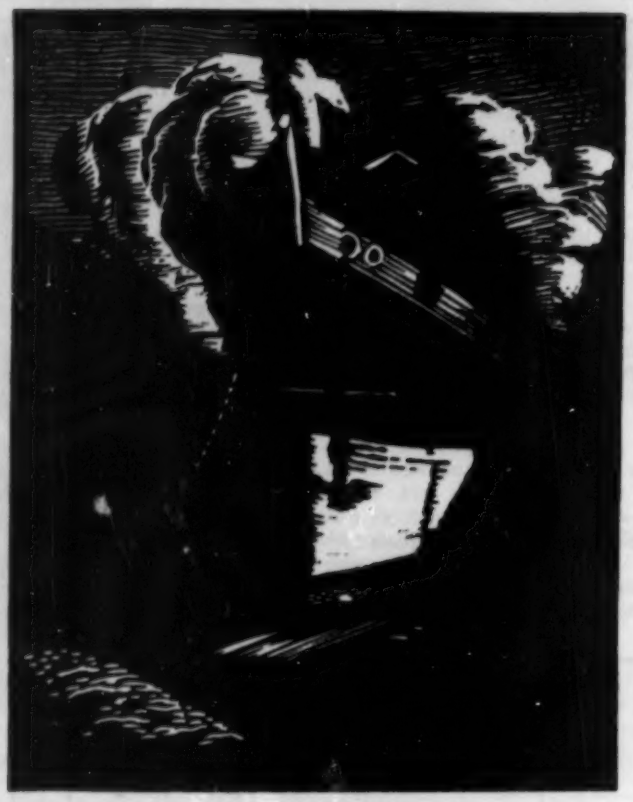
THE TWO BLOCK METHOD OF BLOCK PRINTING

WILLIAM S. RICE

Oakland, Calif.

In Europe during the sixteenth century a certain type of color block printing developed called "Chiaroscuro." This method comprised two printings from two blocks on one sheet of paper. One was the usual black line print, which as a line picture was complete in itself. The other was a tonal, or tint block to be printed as one solid ground of color in sepia, soft warm gray, or other colors from which certain spots were gouged out to leave significant white high lights in the print. The final result resembled the wash drawings of the masters.

This method was said to have been invented by John de Negler in Augsburg, Germany. In Italy Ugo de Carpi was considered its foremost exponent. Allen Lewis and a few others in America are practicing it successfully today. So much for the brief history of the two block method of block printing.



The tint block

The first block is planned in black and white in the usual manner cut from battleship linoleum and is known as the *key* block. A proof is struck off on tracing paper, or typing paper. This wet proof is then laid face down on a clean block exactly the same size as the key block. Rub the back of the proof vigorously with a spoon, or caster cup and remove. The result of that *offset* on the second block will be a reversed image, or impression of the original design. Allow this to dry thoroughly. Then carve with a knife, or gouge the areas intended to show up as white spaces.

After this tint block is completed it is cleaned with a rag saturated with kerosene. The roller may be used to apply the color when only one or a graded tint is desired. Very pleasing results may thus be obtained with simplified colors.

A flat 2-in. brush is sometimes useful to apply the tint to the block instead of the roller. Suppose you wish to use a graduated tint ranging from ivory to deep blue. First, mix separately the ivory and the deep blue with a palette knife. Then with a horizontal movement roll the ivory color from the top halfway down the block, clean the roller (brayer) and, beginning at the bottom of the block, roll on the blue. Roll on the blue upward until it meets and blends with the ivory without showing an abrupt line. For this type of blending the consistency of the inks should be rather stiff and sticky, just as they come from the tube. If one color is heavier or stickier than the other they will not blend satisfactorily. Experiments alone determine the proper adjustment.

Now if you use the brush instead of the roller you had better use a bit of kerosene with the inks in order to brush them on the block and blend them properly. A horizontal brush stroke is required. The printing frame is also recommended for printing in the two block method. All blocks must be absolutely alike in size and be type high.

Mounted linoleum blocks type high, with whitened surfaces, may be purchased in various sizes at art dealers; or you can mount your own linoleum on blocks if you have access to a shop or carpenter tools.

The tint block is inked with the roller and printed first. After removing the tint block from the printing frame and slipping the key block into the place where the former had been, the printing proceeds with the color on the key block in the usual manner. It is not necessary to wait for the tint block impression to dry before the key block impression is made as it can all be done immediately after the tint impression has been made.

Do not expect every print to be a perfect one. Try printing a number, then hang them up on the wall and decide which ones

The key block

The finished print

are the most successful. Pick out the best qualities that each experiment has produced, and mark them 1/100, 2/100, 3/100, 4/100, etc., which explains how many could be in an edition.

No two prints need ever be alike in color or quality; hence, the charm of color block printing.

Artist oil colors may be substituted for printing inks provided printer's mixing white is used in diluting them. The mixing white contains litho varnish, a sticky medium essential to all colors that are to be applied to the blocks with rollers. Printer's ink comes in a variety of colors and is no more expensive than oil colors.

In cold weather, if the inks are too stiff, a few drops of linseed oil may be used to dilute them, but oil should always be cautiously used. The beginner will learn the proper consistency after making some trial proofs. If the ink is too thickly rolled out, too much will be applied to the block; the excess ink will then ooze out under pressure, and ridges of ink will be observed upon the print. The ink will also fill the fine lines and details of the design. Just enough ink to make a sharp impression is desired and this means a thin rolling up.

If any ridges of ink should occur they can be removed by laying a blotter on the print and applying pressure from the back.

With the two block method many variations may be made by the way you ink the tint block. Gradations on the tint block can almost produce a full color effect in the print. It is great fun trying out different color schemes.

A NEW SPINNING CHUCK

DICK HUTCHINSON

San Gabriel, Calif.

The sectional metal spinning chuck described herein is simpler than some of those used heretofore. Such chucks can be made in a short time, right in your own home workshop. These chucks will be of great interest to beginners, as well as to the thousands of professional spinners, for it will eliminate the expense of having costly chucks made to order.

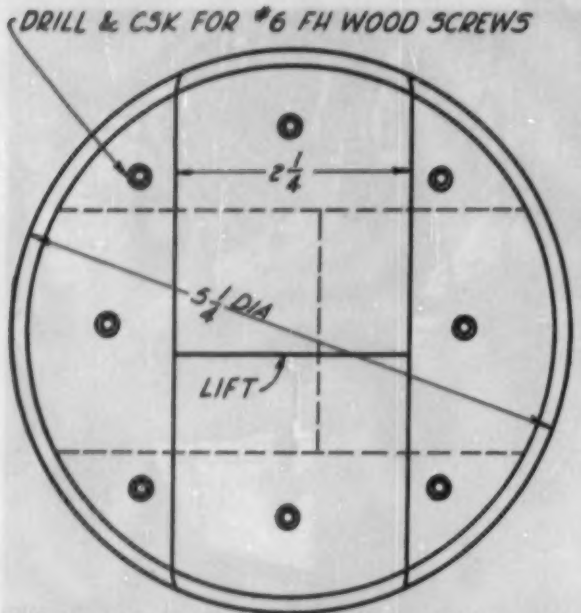
Spinning an aluminum bowl

Better make them from maple, for many beginners who plan on spinning only a few pieces, will — after they experience the thrill of spinning — want to make many more pieces than they originally intended.

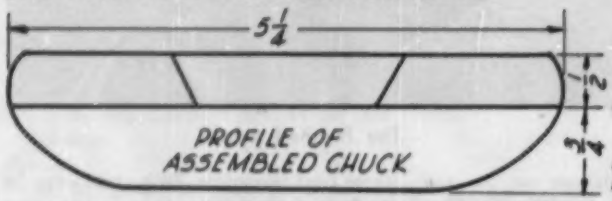
This chuck is designed especially for spinning bowls with a rolled-in top, in which case it would be impossible to remove a solid chuck, after the spinning is completed.

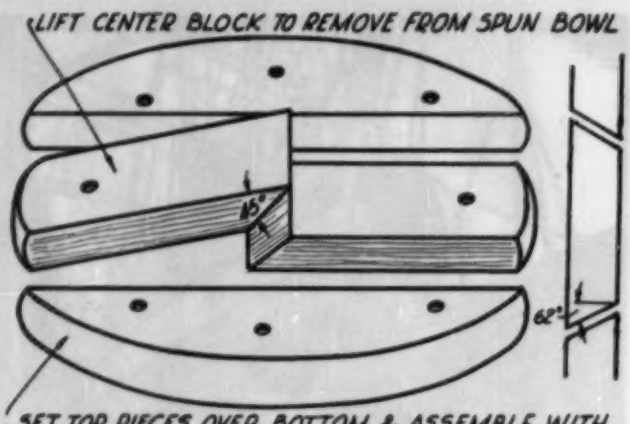
The chuck may be made to spin bowls

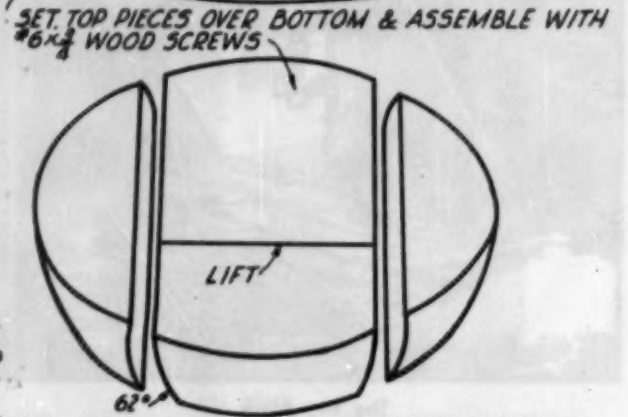
The assembled chuck attached to the faceplate, ready for spinning the bowl



TOP OF WOOD METAL SPINNING CHUCK SHOWING HOW PIECES ARE ASSEMBLED

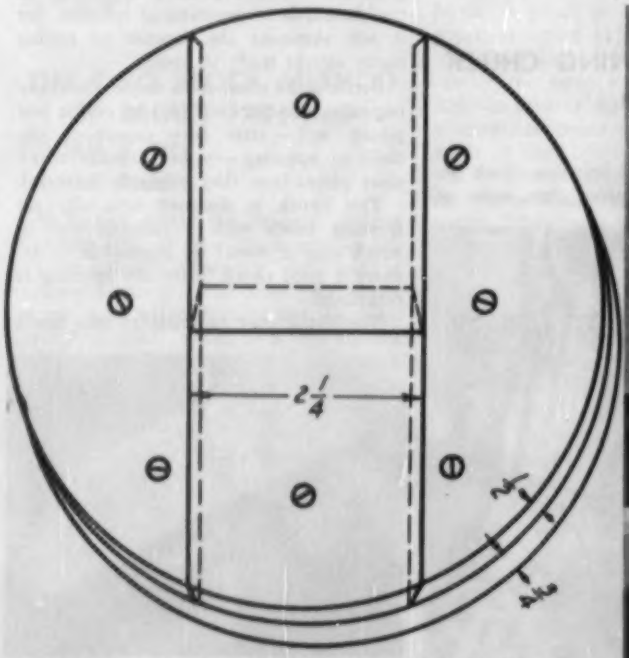




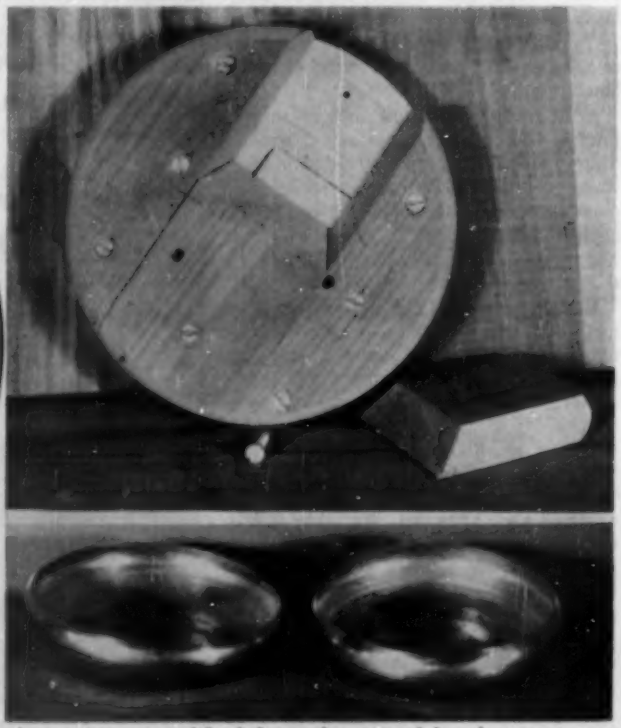


BOTTOM OF WOOD METAL SPINNING CHUCK IS REMOVED FROM SPUN BOWL AS WITH TOP

The top view of the assembled spinning chuck at the left. In the two views above the assembly and disassembly of the pieces are shown before and after turning the bowl



DETAIL OF HOW PIECES ARE ASSEMBLED BEFORE TURNING. SAW OUT ON JIG SAW



At the right is shown the assembled chuck showing how pieces are lifted from the turned bowl one at a time. Lower — Two of the bowls spun with the chuck shown

of any size desired. The one shown here is made of pine, as it was an experimental proposition all the way through. However, we have spun about a dozen bowls, and the chuck is as good as ever. The bottom section of the chuck is of ¾-in. lumber, while the top section is of ½-in. lumber, resulting in a chuck 1¼ in. deep. It measures 5½ in. in diameter, and is assembled with the f.h. wood screws.

Tilt the bench saw to 62 deg., and run the strips of lumber through, making the cuts as shown in the drawing. Then, tilt to 45 deg., and cut the center strips crosswise, as indicated. Drill and countersink the holes to take No. 6 by ¾-in. f.h. wood screws, and assemble the block, and saw out on the band, or jig saw, as shown in the drawing.

Center the block thus assembled, on the lathe faceplate, and turn to the shape desired. One of the drawings illustrates a profile of the chuck we made, which turns out a beautiful, well-proportioned bowl, as is shown in the photographs.

The chuck, as with all wood spinning chucks, is operated attached to the lathe faceplate of the wood lathe, or a metal spinning lathe.

To remove the finished bowl from the chuck, remove the faceplate, then remove the wood screws that hold the chuck together, and lift each section of the chuck out — one at a time. Reassemble, and you are ready to spin the next bowl.

BOUDOIR LAMP

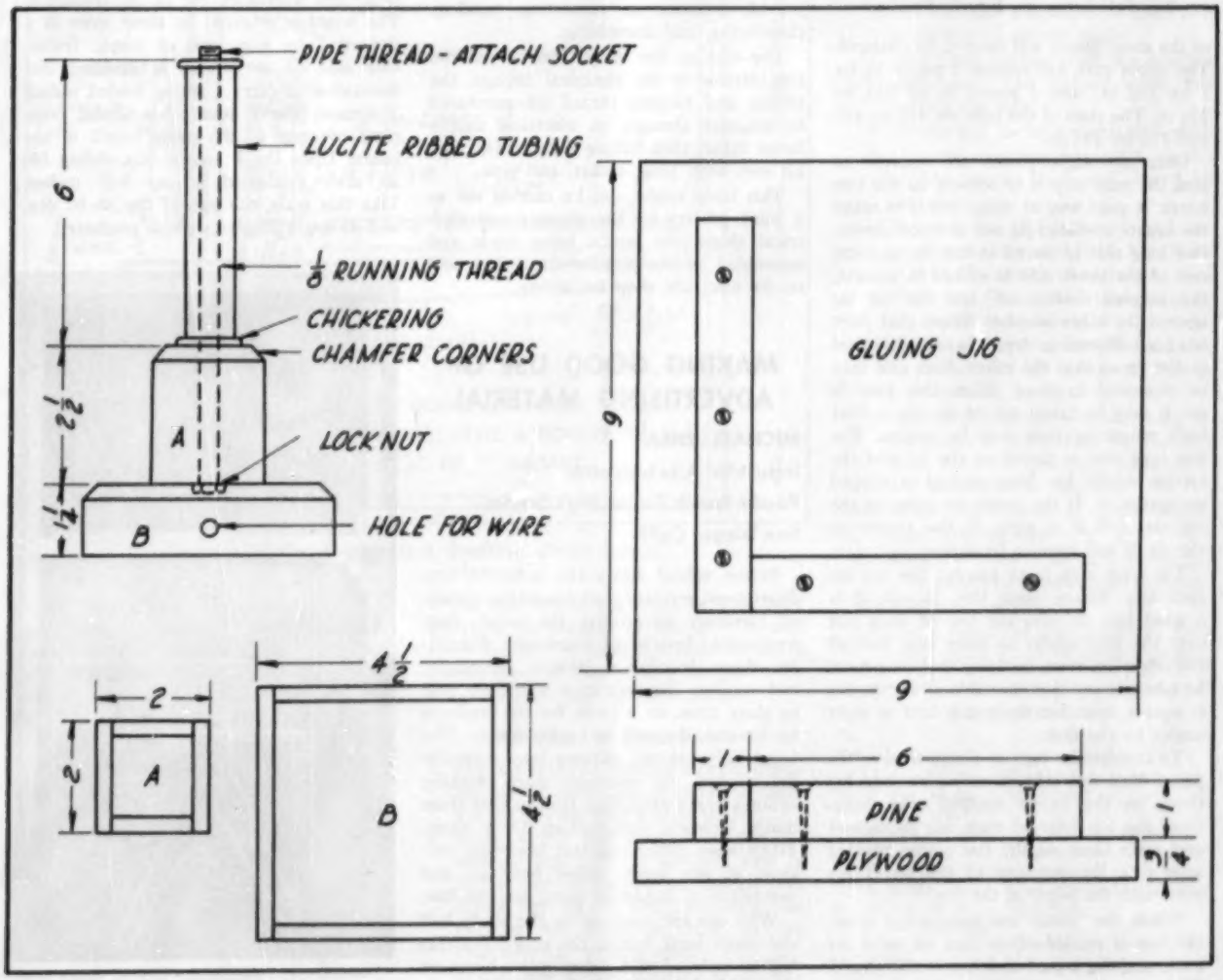
EDWIN PHILLIPS
Chelsea Vocational High School
New York City

The boudoir lamp described herein is not only an attractive and useful project, but it also contains many worth-while working operations. It may be made as an individual project, or a number of them may be made at once under a production-like setup.

As an individual project for a beginning class, the pieces may be rough cut on the band saw, and then squared up to size on the face sander. I have found that the best way to do this is to glue each pair of pieces together with rubber cement so that they may be squared at one time. In this case there will be two pieces ¼ by 1 by 4½ in., and two pieces ¾ by 1 by 4 in. If 5/16 in. thick plastic is used the length

BILL OF MATERIALS

No. of Pcs.	*Material*	*Size*
2	Lucite (may be white, ivory, green opaque)	¼ x 1 x 4½ in.
2	Lucite	¼ x 1 x 4 in.
1	Lucite	¾ x 4½ x 4½ in.
2	Lucite	¼ x 2¼ x 2 in.
2	Lucite	¼ x 2¼ x 1½ in.
1	Lucite	¾ x 2 x 2 in.
1	Running thread	⅛ x 9½ in.
1	Lucite ribbed tubing	⅜ diam. x 6 in.
2	Nickelplate chickerings	⅞ x ⅛ in.
1	Locknut	
1	Socket	
1	Plug	
1 pc.	Extension cord, 7 ft. long	



Details of the boudoir lamp

Boudoir lamp by Edwin Phillips

of the short pieces will have to be changed. The upper part will require 2 pieces ¼ by 2 by 2¼ in., and 2 pieces ¼ by 1½ by 2¼ in. The sizes of the tops are 4½ by 4½ and 2½ by 2½ in.

Once the eight pieces are squared to size, the next step is to cement up the two boxes. A good way of doing this is to make the square cornered jig out of wood shown. One long side is placed in the jig, and the end of the short side is soaked in cement, the surplus shaken off, and the jig up against the other member. When that joint has been allowed to dry, it is turned around in the jig so that the other short side may be cemented in place. When this joint is set, it may be taken out of the jig so that both remaining ends may be soaked. The last long side is placed in the jig and the section which has been soaked is slipped up against it. If the joints are even on the outside, and it is right in the corner of the jig, it will have to be square.

The next step is to cement the top on each box. Before doing this, though, it is a good idea to pass the top of each box over the face sander to make sure that all the edges are even. In doing this, care must be taken to see that the table of the sander is square, and that the box is held at right angles to the disk.

To cement the tops in place, remove the paper from one side of each piece and lay them on the bench masked side down. Soak the top edge of each box in cement and place them on the top pieces, making sure that the outsides of the boxes are even with the edges of the top.

When the joints are thoroughly dried, the box is sanded off so that all sides are even, and the top of each box is chamfered. This may be done by hand filing, or also on the face sander by tilting the table.

After the boxes are sanded and buffed, the holes are drilled for the running thread and the wire. The plastic tubing and running thread are cut to size and the lamp may be assembled.

Making a number of these at one time as a production job will not only provide some actual job training, but will also be a means of providing some worth-while machine experience. To make the sides of the boxes, strips may be ripped 1 in. wide and 2¼ in. wide. The pieces can then be cut to their various lengths by using a stop on the cutoff fence. Cutting a number of pieces at one time is not only good practice, but will also acquaint the students with joblike conditions, and help them to see why mass production lowers the cost of an item.

The lamps may then be assembled all at once, with each member carrying out one of the operations mentioned previously. The pieces may also be stored as stock and used as needed for those students who may not be able to measure or to use machines. For this type student, the job will still provide practice in cementing, sanding, chamfering, and assembling.

The cost of the lamps can be reduced considerably if the electrical fittings, the tubing, and running thread are purchased in quantity through an electrical supply house rather than having each student buy his own wire, plug, socket, and pipe.

This lamp might also be carried out as a joint project by the plastics and electrical shops, the lamps being made and assembled by the plastics shop, then sent to the electrical shop for wiring.

MAKING GOOD USE OF ADVERTISING MATERIAL

MICHAEL RHEA
Industrial Arts Instructor
Pacific Beach Junior High School
San Diego, Calif.

Before school starts the industrial-arts department receives mail consisting mainly of literature advertising the latest shop equipment. Instead of eventually discarding these descriptive folders, pamphlets, and catalogs the instructor would do well to place them on a table for the students to browse through or take home. The beautifully colored pictures may motivate the student to seriously start thinking about a home workshop. He can also glean much technical information from them. Many such folders contain blown-up sections of saw teeth, sealed bearings, and assemblies of important parts, and the like.

Who can tell, perhaps in the study hall the comic book behind the geography text will be replaced with a descriptive brochure of the latest in jig saws.

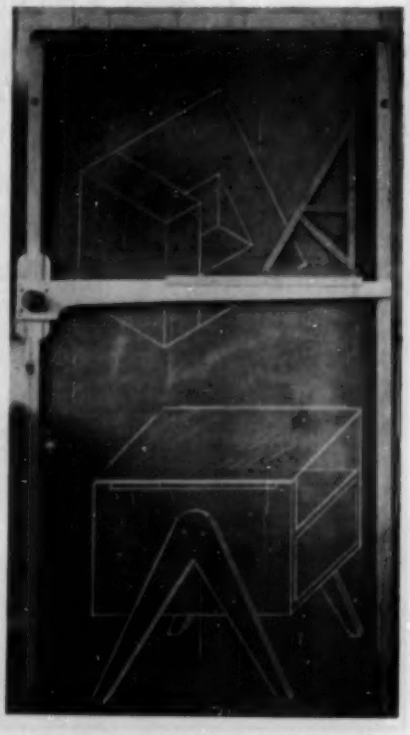
MECHANICAL DRAFTING CHALK BOARD

HAROLD THOMAS, JR.
South Junior High School
Weymouth, Mass.

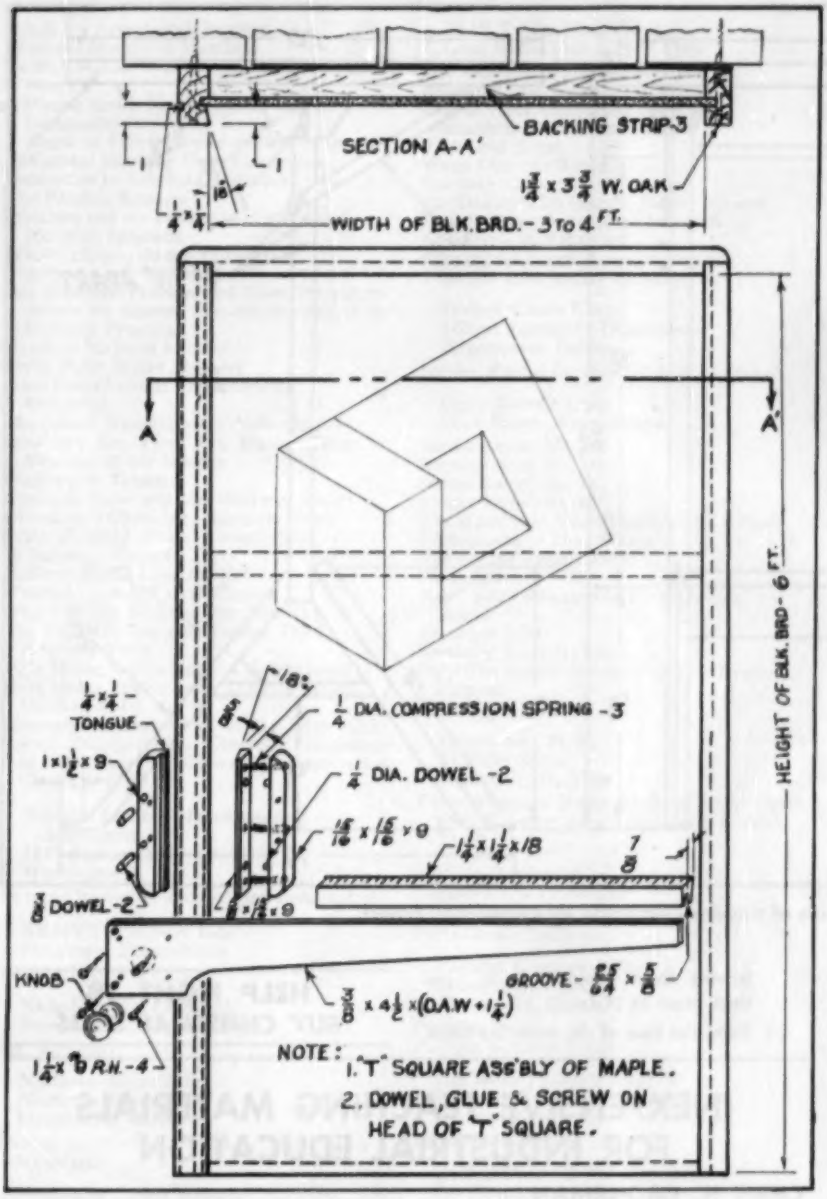
The student workshop instructor at the University of New Hampshire, Wesely Brett, suggested the mechanical drafting chalkboard for designing and laying out full size furniture. As in the photo, an orthographic view of an end table is transformed through cabinet projection to represent the completed project as it would appear resting on the floor.

This same board makes an admirable teaching aid for demonstrating proper mechanical drawing practices and construction to a large drawing class. In the typical shop where wall space is at a premium a vertical chalk board adapts itself very well.

The chalk board is 3 to 4 ft. wide, 7 ft. long, and averaging ⅜ in. in thickness. The board is received on three sides in a dadoed 2 by 4-in. oak or maple frame. One side of the frame is grooved and dovetailed to carry a spring loaded sliding *T* square. The *T* square has almost complete coverage of the entire length of the board. Upon the *T* square is a sliding 18-in. scale graduated in one half inches. Like this scale, the legs of the 30–60 deg. and 45-deg. triangles are also graduated.



Mechanical drafting chalk board


BACKING STRIP-3
SECTION A-A'
1¾ x 3¾ W. OAK
WIDTH OF BLK. BRD. - 3 to 4 FT.
HEIGHT OF BLK. BRD. - 6 FT.
¼ DIA. COMPRESSION SPRING - 3
¼ DIA. DOWEL - 2
TONGUE
DOWEL - 2
KNOB
GROOVE -
NOTE: 1. "T" SQUARE ASS'BLY OF MAPLE.
2. DOWEL, GLUE & SCREW ON HEAD OF "T" SQUARE.

Details of the mechanical drafting chalk board

Drawing table

As the sliding scale was designed to be used as a straightedge the drawing practice will tend to approximate that used with drafting machines, where the straightedge and the scale are combined.

DRAWING TABLE

CLARENCE F. ECHERT
Euclid High School
Euclid, Ohio

A better name for this table might be a "utility table" because of its many uses. The table can be tilted into four positions and easily stored when tilted vertically.

The size of the table can be varied by enlarging the lengths of the uprights and cross pieces. The table described herein is dimensioned so that it may be used with a regular size chair or 18-in. stool.

Method of Procedure

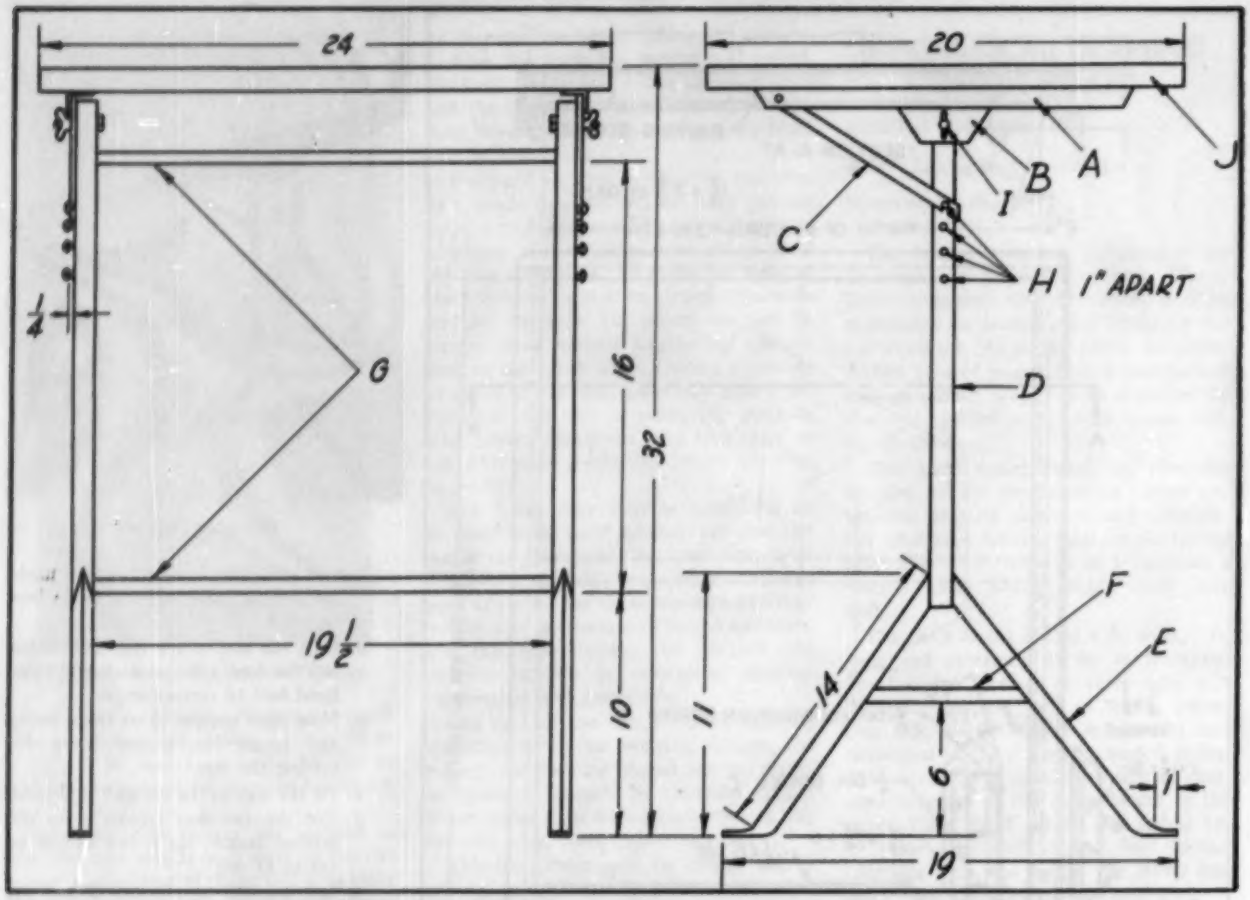
A. Check the bill of material and the drawing for the dimension of parts. All parts are designated with a code letter.

B. Make a full size drawing of the assembled legs and the upright. This is to be used as an aid in bending and fitting legs. In the described table, the drawing was made in chalk on the floor near the welding area.

1. Cut legs *E* and uprights *D* to correct size. The uprights can be made by welding two pieces of angle iron together.
2. Heat the end of the legs and flatten out the foot 1 in. on each end; also bend foot to correct angle.
3. Now place upright *D* on the drawing and locate the proper angle for cutting the legs.
4. Fit the legs to the uprights and weld.
5. Cut the two top frames *A* to described length. Each end should be cut at 45 deg.
6. Lay out the top frames *B* and cut to size. Locate and drill the 5/16-in. hole in the center of each one.
7. Place top frame *B* in the center of top frame *A* and weld.
8. Drill four evenly spaced 5/16-in. holes in each of the top frames *A*. This is for fastening on top.
9. Now drill one more 5/16-in. hole in the frame *A* ½ in. from the end and ⅝ in. from the bottom. Top brace *C* will be riveted at this hole.
10. Make top braces *C*. Drill 5/16-in. holes and cut slot.
11. Rivet to brace *C* to each to frame. This should be loose enough to move.
12. Cut cross pieces *G*.
13. Use a couple of bar clamps to hold cross pieces *G* in between uprights.

BILL OF MATERIAL

No. Req.	Item	Size
2	*A* Top frame	¾ angle iron 16 in. long
2	*B* Top frame	⅛ x 2 x 5 in.
2	*C* Top brace	⅛ x ½ x 9 in.
2	*D* Leg upright	¾ in. square x 18 in.
4	*E* Legs	¾ angle iron 15 in. long
2	*F* Leg cross piece	⅜ rd. stock x 8 in. long
2	*G* Cross piece	⅜ rd. stock x 19½ in. long
10	*H* R.h. rivet	5/16 x ½ in.
2	*I* Bolt and wing nut	⅜ x 1½ in.
1	*J* Top	¾ x 20 x 24 in.



Details of the drawing table by Clarence F. Echert

Be sure that it is square before welding.

14. Make or buy a top. This can be a standard 20 by 24-in. drawing board. The table top, in the picture, was made from a piece of formica that had been cut out in making a sink board.
15. Fasten the top frames to the top. Use No. 8 r.h. screws. Be sure to check that the top braces *B* fit outside of the uprights.
16. Drill a 5/16-in. hole 7/8 in. from the top of each upright.
17. Fasten the top to the frame with 5/16-in. bolts and wing nuts. If a welding bead is laid beside the bolt head, it will keep the bolt from turning when the wing nut is tightened.
18. Place the top of the table into a level position, and swing top brace *C* in a position so that the slot is in the center of the upright. Mark position with a center punch. Now space three more center punch marks 1 in. apart below this. Do this on each upright and drill 5/16-in. holes at each mark.
19. Insert 5/16-in. r.h. rivets in the holes leaving them protrude 1/4 in., and then braze in place.
20. Paint the base of the table flat black.

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National Press Building
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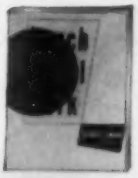

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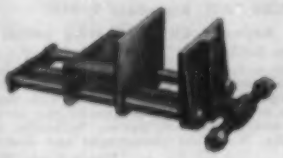

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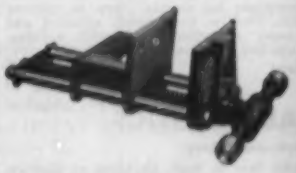

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ASSOCIATION NEWS

(Continued from page 8A)

convention. He also said that the DoAll Company will exhibit their "Civilization Through Tools."

Group meetings on the general shop, graphic arts, mechanical drafting, general metals, woodworking, electricity, and auto mechanics were held on Friday afternoon.

About 50 Epsilon Pi Tau members attended their annual breakfast meeting on Friday morning, November 4, 1955.

MINNESOTA VOCATIONAL ASSOCIATION CONVENTION

The annual convention of the Minnesota Vocational Association was held in Minneapolis on October 27 and 28, 1955. The industrial-arts section of the association were guests of the World Tool and Engineering Company for an interesting and informative plant tour. An industrial-arts demonstration program was held at the Minneapolis Vocational School.

E. D. Peterson of the Minnesota Mining and Manufacturing Company demonstrated "New Finishing Techniques on Wood and Metals."

William A. Kavanaugh of the University of Minnesota and Kenneth Fechter of the Roseville Public Schools, presented elementary electrical project construction and techniques for clarifying basic electrical principles.

An industrial-arts fraternity team from the University of Minnesota demonstrated how to use cold setting polyester plastics and how to laminate acrylic plastics. This team was under the direction of Dr. Howard F. Nelson and consisted of Gene Flug, Wayne Carlson, Glen Hambleton, and Gene Anderson. "Router Tips and Tricks" were demonstrated by William Lawton of the Stanley Tool Company, New Britain, Conn.

The industrial arts luncheon was held in the banquet room of the Minneapolis Y.M.C.A. Robert Grundsted, Robbinsdale Public Schools, was luncheon chairman. Dr. William J. Micheels of the University of Minnesota was toastmaster. Cecil Stanley, president of the American Vocational Association, extended greetings.

The principal speaker was Laird Anderson, superintendent, Ford Motor Company. His topic was "Automation in Industry."

The industrial-arts sectional convention committee responsible for planning the program consisted of Selvin Zabel, St. Paul, Robert Means, Minneapolis, Kenneth Fechter, Roseville, and Robert M. Worthington, St. Paul. — *Robert M. Worthington, Chairman, I. A. Section.*

ZETA CHAPTER, E.P.T. INITIATES FOURTEEN

On November 5, Zeta chapter of Epsilon Pi Tau at Northern Illinois State College, initiated 14 new members, at an impressive afternoon ceremony, held in the college Industrial Arts Building.

Dr. William E. Warner, national executive secretary of Epsilon Pi Tau, spoke briefly to the new members and future Industrial Arts teachers.

Following the initiation, a dinner was held with approximately 60 members and guests attending.

Speakers for the evening were: Milo T. Oakland, industrial arts department head, Francis Geigle, assistant to president, NISC, Lawrence Secrest, faculty trustee, with Dr. Warner giving the main speech at the dinner. Zeta chapter vice-president George Sullivan led the festivities as toastmaster. — *Everett Worrell.*

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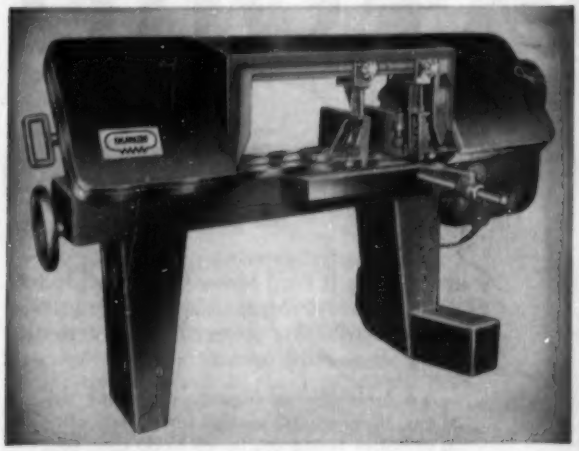

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Bigger for '56! The program for 1956 will be the biggest and best in the 10-year history of I.A.A. We've arranged to display entries in more cities than ever before . . . and to make the program more eventful *locally* in these communities.

FORD

Topflight industrialists and leading educators will act as judges for the I.A.A. Finals in Dearborn, Mich. Projects of unusual merit will be given further examination by members of Ford's Engineering Staff. Practically any industrial arts school project can be entered.

32 Outstanding Achievement Award winners will visit Detroit, with their teachers, as guests of Ford Motor Company. Highlight of the trip is the Annual Awards Banquet. Above, George W. Walker, Ford Vice President and Director of Styling, congratulates a 1955 winner.

I·A·A· PROGRAM

New! Student Craftsmen's Fairs!

Last year, thousands and thousands of people visited the I.A.A. exhibit held at Gimbel's Department Store in Philadelphia. This year, similar displays will be held in many, many cities from coast to coast. These displays will be known as Student Craftsmen's Fairs. Ford Public Relations Committees will assist in making these Fairs *big events* wherever they are held. Judging will begin at the Fairs, and finals will be held in Dearborn, Michigan.

Prizes and more prizes!

750 students will win cash awards, some as high as $100. There'll be awards for creative design and ingenuity—last year, there were 16, this year, 18. There'll be trophies, too. New this year, 72 trophies will be awarded to schools entering a first-place winner. Topping the award list are the Outstanding Achievement Awards. The 32 students who win these will be invited, *with their teachers,* to be the guests of Ford Motor Company for three exciting, event-packed days in Detroit. They'll visit Ford's famed River Rouge Plant . . . the Michigan-Michigan State football game . . . historic Greenfield Village and the Henry Ford Museum . . . and the Grand Awards Banquet.

Any project eligible

Practically any industrial arts project made by a student in the 7th through the 12th grades can be entered! If you have not already received complete information and entry blanks, you can obtain them by writing Ford Industrial Arts Awards, 3000 Schaefer Road, Dearborn, Michigan. Send for yours today!

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(Continued from page 20)

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(Continued on page 22A)

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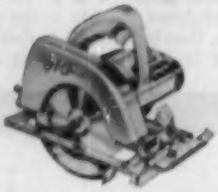

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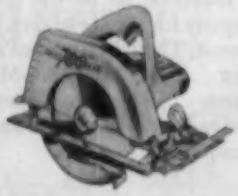

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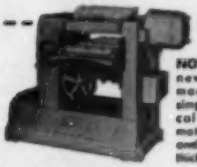

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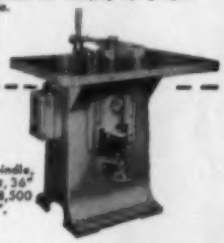

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(Continued on page 24A)

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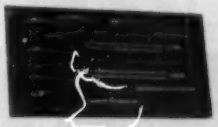

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(Continued from page 22A)

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Diesel . . . The Modern Power, sound motion picture, 16mm.
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Horizons Unlimited, sound motion picture, 16mm.
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Oakland 9, California – 6117 Grove Street (San Francisco Area)
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Pipeline Gas Pioneer, 16mm. sound color
North America Moves Ahead, 16mm. color, sound
You Can Take it With You, color, 16mm. sound
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The Cool Hot Rod, 16mm. black and white
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Pipeline, 16mm. sound color
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Lift, 16mm. black and white, sound
Drag, 16mm. black and white, sound
Thrust, (shipped on reel with Forces in Balance) 16mm. black and white, sound
Forces in Balance, (shipped on reel with Thrust, (shipped on reel with Forces in
Stability, (shipped on reel with Controls), 16mm. black and white, sound
Controls, (shipped on reel with Stability), 16mm. black and white, sound

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(Continued on next page)

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Clear Signal, 16mm. sound-color
Snow on the Run, 16mm. sound-color
Southern Pacific — 100 Years in Texas, 16mm. sound-color
We Build for Safety, 16mm. sound-color
Dangerous Playground, 16mm. sound-color

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Tank Ship, 16mm. sound color
Research — Pattern for Progress, 16mm. sound color
The Wettest Inch, 16mm. sound color
The Last Ten Feet, 16mm. sound, black and white
24 Hours of Progress, 16mm. sound, black and white
Man on the Land, 16mm. sound color
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American Frontier, 16mm. sound, black and white
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Of Men and Wings, 16mm. sound
United 6534, 16mm. color-sound
Flying Colors, 16mm. color-sound
A World in a Week — California, 16mm. color-sound
High Way to Hawaii, 16mm. color and sound
The Sky is For Everyone, 16mm. color-sound
Scotty Wins Her Wings, 16mm. color-sound

U. S. Bureau of Mines, Graphic Services Section, 4800 Forbes Street
Pittsburgh 13, Pa.

Airplanes — Their Metals, Fuels, and Lubricants, 16mm. sound, black and white
Lubrication, 16mm. sound black and white
The Story of Lubricating Oil, 16mm. color

(To be continued)

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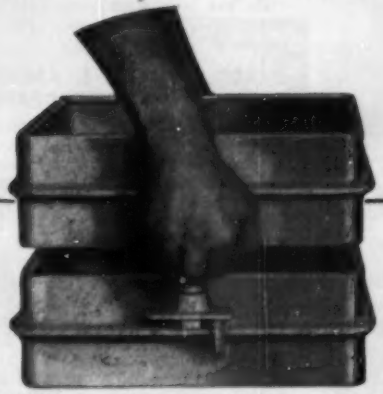

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Personal News

FRYKLUND, STOUT'S PRESIDENT FOR 10 YEARS

On Wednesday, October 5, Dr. Verne C. Fryklund, president of Stout State College, was honored at an informal gathering recognizing his ten years as president.

Under Dr. Fryklund's administration, members of the faculty received several salary increases. He was recently successful in increasing the faculty in number up to 66. Every attempt is being made to employ the instructional staff necessary to meet increased enrollment.

During Dr. Fryklund's decade at Stout, faculty members have been encouraged to undertake further graduate study, research, and authorship. Doctorates increased from 7 per cent of faculty members ten years ago to the present 34 per cent. At the same time the high requirement of practical experience on the part of faculty members is still maintained. The number of widely used textbooks and well-accepted professional articles, all bearing the imprint of Stout authorship, attests to the success of research and authorship.

Students of Stout State College have benefited, too, from a greatly expanded, coordinated system of student personnel services. Well maintained, low cost housing for married veterans and nonveterans has made possible a college education for couples who could never have survived the high cost of living in "university towns." In the years since World War II, Stout can claim one of the highest student family-to-apartment ratios of any educational institution in the nation.

The curricula of Stout State College have undergone thorough study and revision in the past ten years. Since 1946, students in regular session can participate fully in the graduate studies program, an opportunity formerly reserved for summer enrollees. This year the long-awaited major in industrial technology has been begun. The assessing and revising of Stout's technical, academic, and professional education offerings is an unceasing process.

Dr. Verne C. Fryklund deserves great credit on his ten years' work, and we sincerely wish him similar success in the years to come.

DEAN LESSENGER DIES

Dean Waldo E. Lessenger, under whose leadership the College of Education at Wayne University gained first-rank academic standing, died in Detroit on May 14, 1955. He was 56.

This internationally known figure in teacher education had been dean of the College of Education nearly 25 years.

Surviving are his wife, Mrs. Edna Houser Lessenger, two daughters, Mrs. Thornton Dickinson and Susan, a freshman at Wayne, and a sister, Mrs. Melvin Groves, of Denver.

He was past president of the American Association of Colleges for Teacher Education and first chairman of the National Council for Accreditation of Teacher Education.

During the postwar years, Dean Lessenger had often served as consultant for city, state, and national education commissions, and helped establish teacher education programs abroad. At the time of his death, he had been selected to head a Foreign Operations Administration mission to study teacher training institutions in Indonesia.

Dean Lessenger was born in Irwin, Iowa, July 6, 1898. He was a graduate of the State University of Iowa and received his doctorate there in 1925.

DR. MICHEELS RECEIVES AWARD

The National Standard Parts Association has conferred special recognition on Dr. William J. Micheels, professor and chairman of the department of industrial education of the University of Minnesota.

He has been made consultant and adviser to the Associations' vocational program for the automatic service industry.

DR. VERNON E. ANDERSON APPOINTED DEAN

Dr. Vernon E. Anderson, professor of education and director of the curriculum center of the University of Connecticut, was appointed dean of the college of education. He succeeds Dr. Wilbur DeVilbiss who resigned to accept the presidency of the State Teachers College at Salisbury, Md.

♦ Dr. G. Harold Silvius addressed the Central Minnesota Industrial Arts Association at St. Cloud, Minn., on October 12, 1955, on "Current Thinking on Practices for Industrial Education."

On November 7, he presented an illustrated lecture on "Research to Determine Instructional Units for Professional Preparation in Industrial Arts," before the Michigan Curriculum Planning Committee for Industrial Arts at Haven Hill, Mich.

On November 15 he presented a paper on "Suggested Techniques and Practices for Implementing the Public Relations Aspects of Industrial Arts Teacher Education" before the Industrial Arts Conference of the Mississippi Valley.

♦ Thomas M. Steinbach, an executive industrial designer, has been appointed lecturer in product design at the Institute of Design of the Illinois Institute of Technology, Chicago, Ill.

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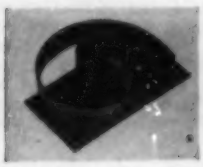

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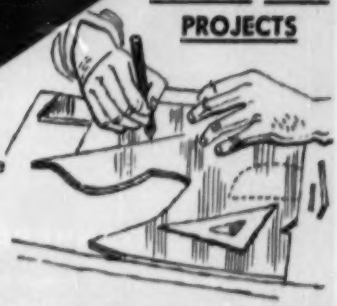

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New Publications

Industrial Manufacturing Chemistry, Part II Inorganic, Vol. II

By Geoffrey Martin, revised by Wilfrid Francis. Cloth, 491 pp., 6½ by 9¾ in., illus. Philosophical Library, Inc., New York, N. Y.

This is the sixth edition of this book. It is a very comprehensive book which has been quite thoroughly revised.

In its many chapters are discussed: organic disinfectants and antiseptics, oxidizing disinfectants, antibacterial drugs and antibiotics, fungicides and insecticides, artificial manures, aluminum compounds, artificial zeolite and permutite industry, artificial gems, Thermit and its application, calcareous cements, sorel cement, artificial stone, sodium silicate, lutes and other cements, clays, pottery, earthenware, porcelain, stoneware and sanitary ware, bricks, tiles and terrac-cotta, furnace linings, glass, enamels, asbestos, mica, thorium and cerium, titanium, zirconium, tantalum and niobium, tungsten, electric lamp manufacture, uranium, vanadium, radioactive substances, electric furnace products, grinding and polishing materials, phosphorus, and atomic power.

General Metal — Principles, Procedures, Projects

By Roland R. Fraser and Earl L. Bedell. Cloth, 244 pp., 6¾ by 9½ in., illus., $3.50. Prentice-Hall, Inc., New York, N. Y.

A well-arranged book replete with well-explained and illustrated material on metals, tools, procedures, and projects.

There are 13 chapters in this book, which describe the properties and uses of materials; planning shops and projects; the use of measuring and layout tools; the uses of cutting tools and filing; taps and dies; doing the various types of sheet-metal work, metal spinning, ornamental iron work, heat treating, molding and casting; and the use of power tools.

Handbook of 630-Type TV Receivers

Paper cover, 200 pp., 5½ by 8½ in., $3.50. John F. Rider, Publisher, Inc., New York, N. Y.

This handbook is a new approach in the presentation of servicing information on this type of receiver.

It sets forth the *whys* and *hows* of each of the original 630-type receiver sections, then analyzes and explains in detail the many modifications and improvements which were made by the different manufacturers of this receiver to date.

Conversion data in the form of procedures for converting older sets to larger picture tubes, adding keyed automatic gain control, improving video gain, reducing 4.5 mc interference, improving fringe area reception, accommodating uhf reception, and many other extremely valuable and informative details are given. Many troubleshooting charts are included to facilitate servicing.

Radio Operating Questions and Answers

By J. L. Hornung and A. A. McKenzie. Cloth, 571 pp., 5¾ by 8¼ in., illus., $4.50. McGraw-Hill Book Co., New York, N. Y.

This is the 12th edition of this text. It has been thoroughly brought up to date in order to help prospective radio operators pass the FCC license examinations. The book contains answers to more than 1900 questions on radio laws, regulations, and operating questions; general theory, transmitters, receivers; power supplies, batteries, motors, motor generators; and information about numerous special endorsements.

New questions for several sections of the book have been placed into the appendix. The book will be found helpful for those studying for the following licenses: radiotelephone operators; first, second, and third class radiotelegraph and telephone permits; aircraft radiotelegraph endorsement, and ship radar endorsement.

Getting Started in Farming

By Sherman E. Johnson, Milo J. Peterson, and others. Cloth, 372 pp., 6¼ by 9¼ in., illus., $4.20. D. Van Nostrand Co., Inc., New York, N. Y.

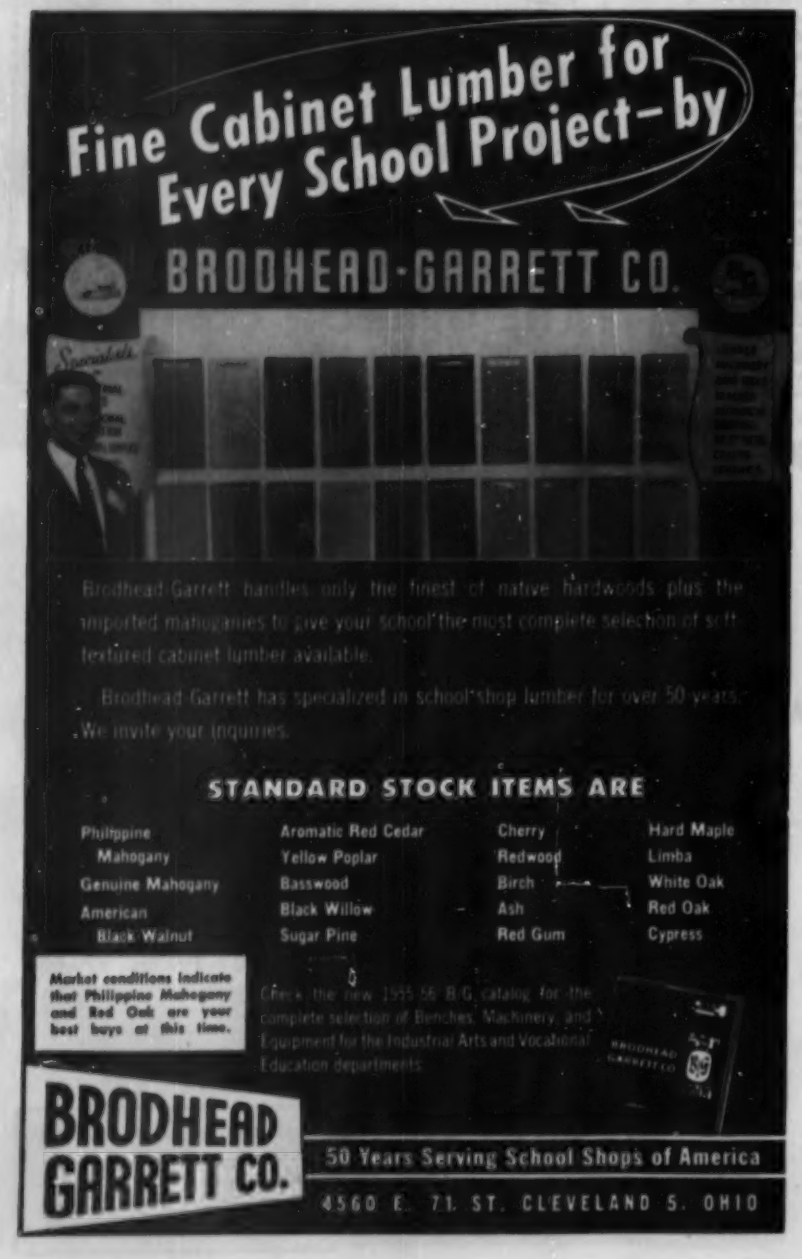
A textbook dedicated to and written for "The Future Farmers of America" who are studying vocational agriculture.

The book is divided into five parts. The first of these discusses the development of the student's farm program; learning on the home farm, and studying other farms in the home and other areas.

The second part discusses the three E's — education, experience, and environment — required to make a good farmer; how to select a farm of the best size; how to make it productive; how to improve it and make it the good farm that a good farmer needs and should have.

The third part shows how to improve the farmstead and the home, how to select and use farm power machinery, and how to set up a good farm work program.

The fourth part takes up the keeping and using of records, business methods, managing money and credit, and getting adequate returns from the farm enterprise.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The fifth part presents the problem of starting out on one's own farm, working with others on farm management problems, and how to adapt your farm to changing conditions.

Teamwork in Handling Guidance and Health Problems

Edited by Warren H. Southworth and Desmond D. O'Connell. Paper, 69 pp., 8½ by 10¾ in., $1. Kramer Business Service, Madison, Wis.

This is a report of a co-ordinated conference on guidance, personal services, and health education held during the 1955 summer session at the University of Wisconsin.

During this conference the following questions were discussed: children's problems discussed with parents and community agency workers; strengthening relationships between school and guidance and health specialists; considering secondary school problems; co-ordinating college-student workers' efforts to assist students.

Field trips also were held and these are outlined in this report, as are also the discussion outline on college student personnel services.

A bibliography also is appended.

News Notes

♦ The New York City school system's vocational division joined forces with the National Society for the Prevention of Blindness to launch a program of 100 per cent eye protection in school shops.

Two of the city's trade schools — Bronx VHS, and McKee VHS — will require this term that shop students wear goggles or other protective devices at all times while in the schools' shops.

♦ Two Michigan high school seniors are the 1955 winners of the Atlas Press Company scholarship competition at Western Michigan College, Kalamazoo, Mich.

They are Ernest Wm. Sanders, Edwardsburg, and Dan Wooton, Detroit.

As part of their winnings they will receive $500 scholarships, with the intention that they will enter the field of teaching at the conclusion of their college work.

This is the third year that Atlas Press has offered this competitive scholarship program to Western Michigan College and senior students in the high schools of Michigan.

♦ An organization called Junior Engineering Training for Schools (JETS) this fall entered its fifth year of bringing the facts about engineering to high schools — in a way that helps students and hard-pressed schools of engineering.

Since the first JETS club was organized in the East Lansing, Mich., high school in November, 1950, the program has spread to include 59 clubs in 11 states with an active membership of more than 1000 boys and girls.

The working idea for JETS originated in 1950 with Lorin G. Miller, then Dean of Engineering at Michigan State University. He believed there should be a "4-H club of Engineering" to tell young men and women what engineering is and what opportunities it offers.

♦ Vocational auto mechanics instructors attended courses offered by the General Motors Training Center in Oklahoma City, Okla., June 20 to July 1. The courses included power brakes and power steering, body sheet metal repair, carburetion, hydra-matic transmission, and power glide transmission. The training program emphasized up-to-date methods and techniques, and the latest equipment was used in the course of instruction.

♦ Over 400 students, from 8th to 12th grade, submitted their school printing projects as entries in the Ford Motor Company's ninth annual Industrial Arts Awards Competition, held in Dearborn, Mich., during the week of July 11. The entries included printing in one, two, and more colors in letterpress, offset, and silk screen. Over 80 cash prizes were awarded the best examples by the judges: John T. Porter, educational director, American Type Founders, Elizabeth, N. J.; Harry A. Gage, graphic arts consultant, Annisquam, Mass.; and Samuel M. Burt, managing director, Education Council of the Graphic Arts Industry.

Two graphic arts entries received outstanding achievement awards which entitle the winners and their teachers to receive a three-day, all expense paid trip to Dearborn. These winners are: Jerome E. Latawiec, 19, of 1606-A South 7th St., Milwaukee, Wis., Milwaukee Boys' Technical School; and Merle Baghtel, 14, of 11300 Patton St., Detroit, Mich., Tappan Intermediate School.

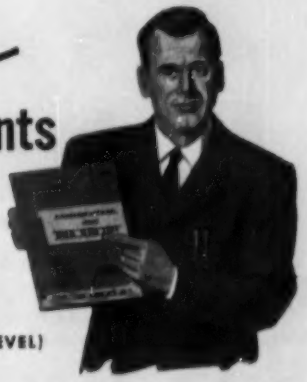
♦ The Professional Group on Electron Devices of the Institute of Radio Engineers will hold its first Annual Technical Meeting October 24 and 25 at the Shoreham Hotel in Washington, D. C., as announced by George A. Espersen of Philips Laboratories, Inc., PGED chairman. It will be the first of the annual meetings on electron devices to provide an exclusive medium for exchange of engineering information in this rapidly advancing field.

Mr. Espersen also announced that the chairman of the Washington meeting will be George D. O'Neill of Sylvania Electric Products, Inc.

Send for

"Electrical Requirements for High School Electric Shops"

(INDUSTRIAL ARTS LEVEL)



You should have Booklet No. 205 . . . *especially* if you are planning a new shop or re-vamping your present one. This booklet gives valuable suggestions; offers a shop layout plan and lists fundamental requirements.

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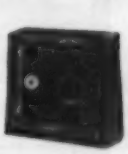

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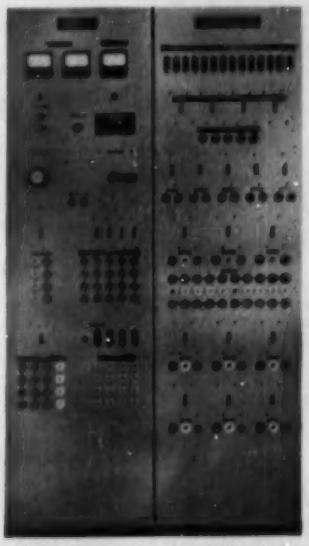

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Shop Equipment News

DELTA 10-IN. TILTING ARBOR SAW

A new bench model tilting arbor 10-in. circular saw has been introduced by Rockwell Manufacturing Company's Delta Power Tool Division.

New Delta 10-in. Arbor Saw

The new tool — Delta's first bench model tilting arbor saw in the 10-in. size — obsoletes the Delta 10-in. tilting table saw.

The new saw cuts stock up to 3⅛ in., weighs slightly over 200 lb., is operated by a 1-h.p. motor.

It is readily adaptable for use in combination with the new Delta 6-in. long-bed jointer. The two machines will be teamed up in a new combination tool expected to be introduced in 1956.

(For Convenience Circle Index Code 0101)

THE NEW BELSAW PLANER

The Belsaw Machinery Company has recently produced a new 12¼ by 6-in. thickness planer which can take care of widths up to 12¼ in., and thicknesses from 5/16 to 6 in. The rate of feed is 14 to 34 ft. a minute.

The machined top, cast iron bed is 12⅝ in. wide by 42 in. long.

The cutterhead is 3¼ in. diameter, and there are three high-speed steel knives. A Belsaw 956 electric knife grinder can be furnished for sharpening the knives in the cutterhead.

Another attachment that is available will make this machine into a combination planer and jointer.

(For Convenience Circle Index Code 0102)

REVISED DeWALT CATALOG

DeWalt Inc., a subsidiary of American Machine & Foundry Company, has issued a revised 20-page catalog and descriptive booklet covering the firm's "Power Shop" line of radial arm type machines.

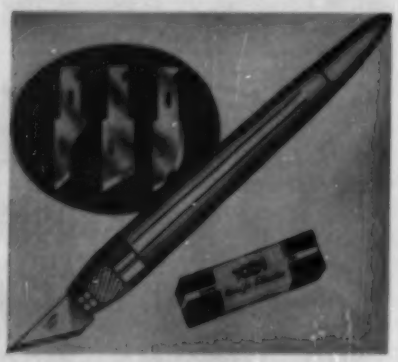
The new catalog presents information on the company's Model MB-F, recently announced as the 1956 version of a previous Model MB-C. The later model incorporates 12 major design changes, the most prominent of which is a ¾ h.p. motor replacing a ½ h.p. counterpart on the earlier machines.

Other new features of the catalog are descriptive data on several recently announced accessories for the basic machine. Noteworthy among these are a shaper guard which completely encloses cutting knives and spindle of the "Power Shop" when in operating position as a shaper, and a shaper-jointer fence with precision adjustment for accurate determination of stock removal.

(For Convenience Circle Index Code 0103)

THE NEW MURPHY NO. 1001 KNIFE

The R. Murphy Company have perfected a new No. 1001 reblade handled knife in which the blade is firmly locked into place.



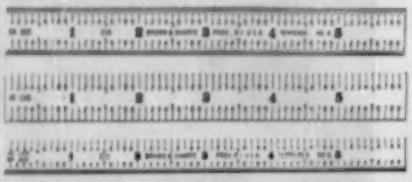
Murphy No. 1001 Reblade Handle

It is obtainable in an attractive box containing a handle, two blades, and a honing stone. It may also be obtained with five blades at a slightly higher cost.

(For Convenience Circle Index Code 0104)

NEW DECIMAL STEEL RULES

An innovation of particular value to users of steel rules who work to blueprints on which dimensions are given in decimal parts of an inch is announced by Brown & Sharpe Mfg. Co. The new No. 310 Chrome Finish Flexible Steel Rule and No. 318 Chrome Finish Tempered Steel Rule, in 6-in. lengths, have decimal graduations. These rules, graduated in tenths and 50ths, make it possible to transfer measurements in decimal parts of an inch without any computation.



New Brown and Sharpe Decimal Steel Rules

In addition to having the advantage of decimal graduations, the dull chrome finish is nonglaring, and the jet black figures and graduations on the dull chrome make the rules especially easy to read.

The chrome finish is rust and stain resistant and very hard and long wearing, keeping the figures and graduations permanently clean and strong.

(For Convenience Circle Index Code 0105)

KODAK OFFERS ONE DAY PROCESSING OF FOOTBALL FILMS

Special one day processing service for football films will once again be offered by the Eastman Kodak Company.

For pictures of week-end games Kodak Processing Laboratories will be open on Sundays to process both 16mm. Cine-Kodak black-and-white and Kodachrome films. The Chicago, Dallas, and Palo Alto laboratories will handle both Kodachrome and black-and-white; Washington and Chamblee, Ga., Kodachrome only; Flushing and Rochester, N. Y., black-and-white only. Both types of sports films will be expedited for the fastest possible service throughout the week.

Special Sports Films labels and packing memos are available from any one of the Kodak laboratories. Their use is urged to insure fastest possible handling of the film. Kodak will also make arrangements for picking up or accepting films delivered by bus lines or messenger services.

(For Convenience Circle Index Code 0106)

COBALT HIGH SPEED DRILLS

Whitman & Barnes, Division of United Drill and Tool Corp., Plymouth, Mich., manufacturers of drills, reamers, and carbide tools, have announced the production of a complete series of Cobalt High Speed Drills.

Cobalt High Speed Drills

The new series is made of a special Cobalt High Speed Steel and is engineered for use on applications and in materials where drills of conventional high speed steels may not perform satisfactorily. These drills give great performance in materials such as stainless steels, manganese steels, armor plate, silicon-chromium, valve steels, etc., and in many cases make possible the increase of drilling speeds as much as 30 per cent.

These Cobalt High Speed Drills are available in straight and taper shanks and in a complete range of fractional, jobber, letter, and wire gauge sizes.

(For Convenience Circle Index Code 0107)

BERKROY RUBBER STAMP PRESS

The Berkroy Products Company is introducing a new rubber stamp press. This press is a low cost, compact rubber stamp maker which can be easily co-ordinated into graphic arts training as well as supply the many rubber stamps used in school administrative and class activities.

Berkroy Rubber Stamp Press

Designed by industrial-arts instructors, the Berkroy press has been under extensive research, tests, and school shop use for more than four years. It operates on 110-volt a.c.

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Two valuable booklets covering classroom projects in Ceramics, Ceramics without a kiln, How to Make Molds, Wirecraft, Feltcraft, Woodcraft, Rusticraft, Planters, Patio Furniture Metalcraft, Metal Etching, Glass Etching, Casting with Liquid Plastics, Waxcraft, How to Make Beautiful Jewelry, How to Imbed Biological Specimens, Liquid Marble, Gemcraft Without Tools, Plastic Putty, Porcelizing, Laminating and many other subjects are available to teachers and school administrators. These booklets are *free of charge* if you will send us the name of the school and the subject or subjects most interested in.

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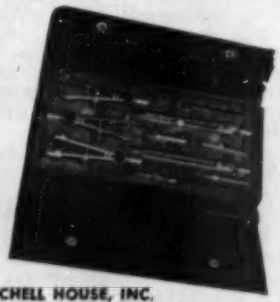

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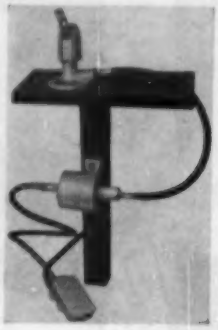
electricity, will reach operating temperatures in only twenty minutes, has a heat indicator to eliminate guesswork, and is equipped with a built-in timer and warning bell, pilot light, heat indicator, thermostatic control, and limit stops on the vulcanizer and chase.

(For Convenience Circle Index Code 0108)

AIR-POWERED HYDRAULIC WORK POSITIONER

The Wilton Tool Manufacturing Company has announced a new air powered hydraulic work positioner, with a work weight capacity of 105 pounds.

The new model is known as "Air Powered



Hydraulic PowRarm
No. 393

Hydraulic PowRarm No. 393." It features remote touch control, the primary source of power of which is compressed air at 60 to 100 p.s.i. The factory air system is connected through a foot pedal into an air-hydraulic booster cylinder. Air pressure is multiplied and converted to hydraulic pressure, which is transmitted through a shielded hose into the body of the positioner.

The PowRarm contains a universal ball-and-socket arrangement free to move through all 3 planes. At the touch of a toe, the operator locks the PowRarm in any desired angle and position; reversing the foot pedal releases air pressure from the system, freeing the PowRarm and enabling the work to be rotated to any new position.

(For Convenience Circle Index Code 0109)

DIP'N DAB — NEW GLUE APPLICATOR

Without removing the lid, merely pull out the Dip'n Dab applicator, and just enough

Dip'n Dab applicator

(Continued on next page)

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SHOP EQUIPMENT NEWS

(Continued from previous page)

glue will be on the tip to do a multitude of small jobs. The Dip'n Dab is brush shaped to make a handy spreader; never a drop touches the fingers. When the applicator is returned, it is self-sealing for storage. This is the one glue dispenser that never gets out of order. This glue is made by the Wilhold Products Company.

Dip'n Dab is highly desirable for such projects as millinery, making lampshades, graphic arts, model making, and the like. The Dip'n Dab size is excellent for strong, long lasting repairs, chairs, drawers, veneers, moldings, tile, china, pottery and for gluing linoleum, leather, fabrics, etc.

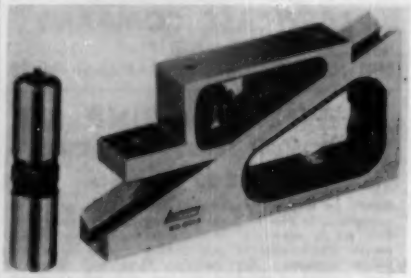
Wilhold Glue is an immaculately clean, white liquid glue. It is odorless, dries colorless and stainless, and is noninflammable. It is available in ¾- or 1¾-oz. jars.

(For Convenience Circle Index Code 0110)

TWO NEW PLANER GAUGES

Two new models of Planer Gauges with one inch wide bases have been announced by The Lufkin Rule Company. The extra width of the bases makes the gauges more stable and easier to use. Both gauges have increased capacity (up to 10¼ in. with extensions), and a new plumb level for using the gauge on end.

The new model No. 901A Planer Gauge also features a rapid adjustment locking device for



No. 901A Planer Gauge

quick positioning of the gauge and a fine adjustment for final, precise setting.

Both gauges are available with the 3-in. extension in a fitted mahogany case or in sets which include both 1-in. and 3-in. extensions, a straight scriber, an offset scriber and gauge extension, and a scriber holding attachment.

(For Convenience Circle Index Code 0111)

MAGNESIUM LEVELS

Four new magnesium levels, said to be one third lighter than aluminum levels of the same lengths, are announced by The Columbian Vise & Mfg. Co.

Available in 24-, 48-, 72-, and 96-in. lengths, the new levels are made of strong, extruded magnesium I beams, not cast like many level frames. These levels are unaffected by heat, cold, and moisture.

The new levels have adjustable, replaceable vials. Attached to the frame by 2 standard screws, each vial assembly can be quickly loosened, tightened, or taken out. Vial case and window are a one-piece unit of shatterproof, clear plastic which serves as vial holder and also as a protective lens.

(Continued on page 36A)

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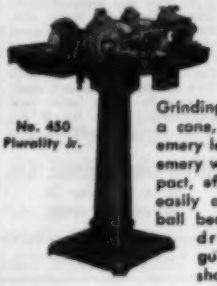

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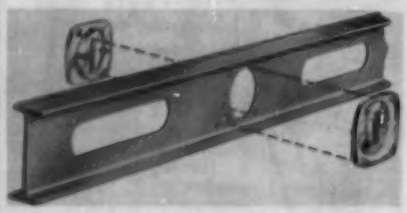
SHOP EQUIPMENT NEWS

(Continued from page 34A)



Columbian Magnesium Level showing removable vials

The 24- and 48-in. levels have 4 plumbs, 2 levels. The 72- and 96-in. models have 6 plumbs, 4 levels.

(For Convenience Circle Index Code 0112)

THE 1955–56 B-G CATALOG

The Brodhead Garrett Company is now delivering its 1955–56 annual catalog and you can get your copy by writing for it.

It is a complete list of one source of supply of quality merchandise. The catalog lists soft- and hardwoods power machinery, accessories, metalworking machinery, electric motors, electric grinders, drills, and sanders, workbenches of many kinds, electric test benches, ceramics unit, art and drafting benches, vises and clamps, hand and power tools, carving tools, abrasive stones, automotive testing equipment, tools, wrenches, drills, stocks and dies, furniture trim and hardware, painting equipment and materials, finishing materials, glues, fire extinguishers, electronics kits and supplies, electric materials, soldering irons, solder and fluxes, blowtorches, metalworking tools, welders and welding supplies, sheet-metal machinery and tools, portable, gas, and electric forges, molder's supplies and equipment, art-metal anvils and stakes, Plexiglas, leatherwork tools and supplies, linoleum blocks, linoleum cutters and block printing presses, looms and weaving materials and equipment, ceramic shop equipment, electric kilns and supplies, fine arts supplies, airbrush equipment, and drafting instruments, and general shop books.

(For Convenience Circle Index Code 0113)

APPALACHIAN HARDWOODS

The Appalachian Hardwood Manufacturers, Inc., have made available a wall chart which they will send gratis to industrial-arts teachers who apply for it. This chart shows the uses and properties of Appalachian hardwoods, and drawings on how to make various small items adaptable to the industrial arts and vocational training classes, and the "do-it-yourself" enthusiast.

(For Convenience Circle Index Code 0114)

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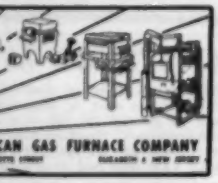

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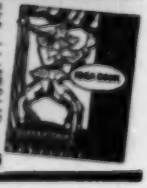

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January, 1956

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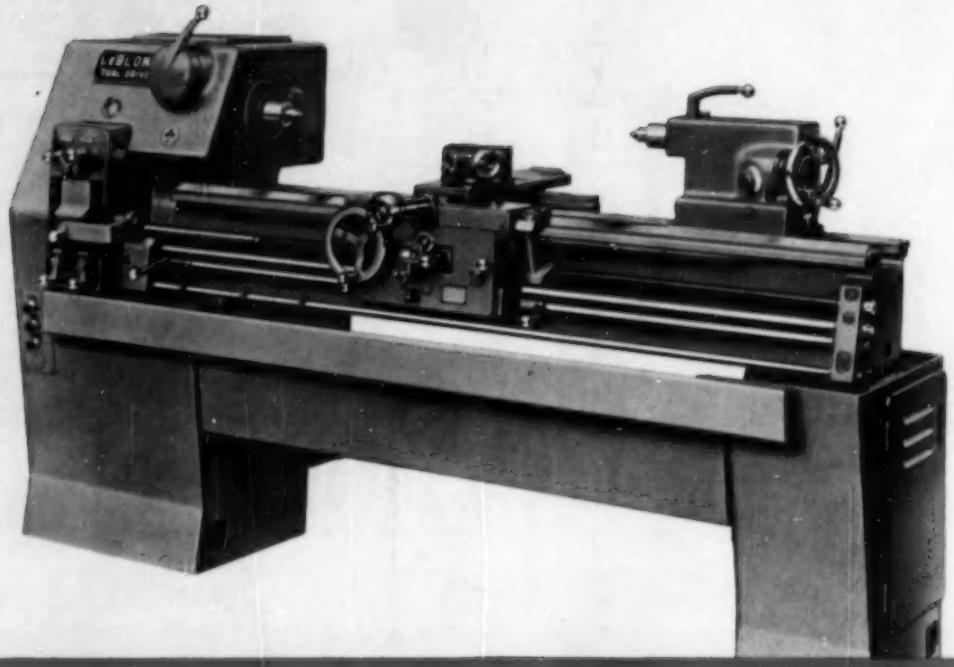

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